İstanbul Gelişim Üniversitesi kurumsal yayını olan Sağlık Bilimleri Dergisi, yılda üç kez yayımlanan uluslararası hakemli bir dergidir. Makalelerdeki görüş, düşünce, varsayım veya öneriler eser sahiplerine aittir; İstanbul Gelişim Üniversitesi sorumlu tutulamaz.

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İSTANBUL GELİŞİM ÜNİVERSİTESİ SAĞLIK BİLİMLERİ DERGİSİ:
İNDEKSLENME VE HARMANLANMA BİLGİLERİ /
ISTANBUL GELISIM UNIVERSITY JOURNAL OF HEALTH SCIENCES:
INFORMATION ABOUT INDEXING AND HARVESTING

DİZİNLENME / INDEXING

Dergimiz, TÜBİTAK ULAKBİM TR Dizin tarafından 2020 yılından bu yana dizinlenmektedir.

Dergimiz, Türkiye Atıf Dizini tarafından 2017 yılından bu yana dizinlenmektedir.

Sağlık Bilimleri Alan İndeksi

HARMANLANMA / HARVESTING

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Editörden

Merhaba,

Sizlere Üniversitemizin bir başarısını daha bildirmekten büyük bir mutluluk duyuyorum. İstanbul Gelişim Üniversitesi (İGÜ), Yükseköğretim Kalite Kurulu (YÖKAK) tarafından gerçekleştirilen kurumsal akreditasyon değerlendirmesi sonucunda 5 yıl süreyle tam akredite edildi.

Kurumsal akreditasyon, üniversitelerin eğitim, araştırma, yönetim ve topluma hizmet alanlarında belirlenen kalite standartlarını sağlayıp sağlamadığını değerlendiren önemli bir süreçtir. YÖKAK tarafından akreditasyona yönelik yürütülen titiz değerlendirme süreci, yükseköğretim kurumlarının ulusal ve uluslararası ölçekte gücünü artırmayı, şeffaf ve sürdürülebilir bir kalite güvencesi sistemi oluşturmalarını sağlamaktadır.

Kurumsal akreditasyon almaya hak kazanan üniversiteler, kalite süreçlerini başarıyla yönettiklerini, eğitimde sürdürülebilir gelişimi benimsediklerini ve topluma değer katma görevlerini etkin bir şekilde yerine getirdiklerini YÖKAK tarafından verilen bu belge ile kanıtlamaktadır.

Bu yıl 35 üniversite YÖKAK tarafından akreditasyona yönelik değerlendirmeye alındı. Sonuçlara göre yalnızca 4 üniversite tam akreditasyon alırken, 27 üniversite koşullu akreditasyon ile sürece devam etti. 4 üniversite ise akreditasyon hakkı elde edemedi. İGÜ, tam akredite edilen 4 üniversiteden biri olarak yükseköğretimdeki kalite standartlarını en üst düzeye taşıdığını aldığı bu belge ile bir kez daha kanıtladı.

Kalite güvencesi, sadece bugünün değil, geleceğin üniversitesini inşa etme sorumluluğudur. Yazarları, hakemleri ve tüm İGUSABDER ekibi ile bu süreçte yer almaktan gurur duyduğumuzu belirtmek istiyorum. Emeği geçen herkese sonsuz teşekkürler.

Sağlıcakla kalın, saygılarımla.

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Dr. Öğr. Üyesi A. Yüksel BARUT

Editör

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From the Editor

Dear All,

It is with great pleasure that I share another achievement of our university with you. Istanbul Gelisim University (IGU) has been granted full institutional accreditation for a period of five years following the evaluation conducted by the Higher Education Quality Council of Türkiye (YÖKAK).

Institutional accreditation is a critical process that assesses whether universities meet established quality standards in education, research, administration, and community service. The rigorous evaluation process carried out by YÖKAK aims to enhance the strength of higher education institutions both nationally and internationally, and to support the establishment of a transparent and sustainable quality assurance system.

Universities that are awarded institutional accreditation demonstrate, through this official recognition, that they successfully manage their quality processes, embrace sustainable development in education, and effectively fulfill their mission of contributing to society.

This year, 35 universities underwent accreditation evaluation by YÖKAK. According to the results, only four universities were granted full accreditation, while 27 universities proceeded with conditional accreditation. Four universities did not achieve accreditation. As one of the four universities to receive full accreditation, IGU has once again proven its commitment to upholding the highest standards of quality in higher education.

Quality assurance is not only a responsibility of today, but also a fundamental commitment to building the university of the future. We are proud to have been part of this process alongside the authors, reviewers, and the entire IGUSABDER team. I extend my heartfelt thanks to everyone who contributed to this achievement.

Wishing you all the best,

Asst. Professor A. Yüksel BARUT

Editor

İstanbul Gelişim Üniversitesi, Sağlık Bilimleri Fakültesi'nin aşağıdaki Bölümleri, Almanya merkezli **Accreditation Agency in Health and Social Sciences / Akkreditierungsagentur im Bereich Gesundheit und Soziales (AHPGS)** tarafından 2018-2023 arasında koşulsuz olarak akredite edilmiştir:

Beslenme ve Diyetetik (Türkçe-İngilizce),
Çocuk Gelişimi (Türkçe-İngilizce),
Ergoterapi,
Fizyoterapi ve Rehabilitasyon (Türkçe-İngilizce),
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Odyoloji,
Sağlık Yönetimi,
Sosyal Hizmet (Türkçe-İngilizce).

&

*The Following Departments of Istanbul Gelisim University, Faculty of Health Sciences have been unconditionally accredited by the Germany based **Accreditation Agency in Health and Social Sciences / Akkreditierungsagentur im Bereich Gesundheit und Soziales (AHPGS)** between 2018-2023:*

Audiology,
Child Development (Turkish - English Tracks),
Health Management,
Nursing (Turkish - English Tracks),
Nutrition and Dietetics (Turkish - English Tracks),
Occupational Theraphy,
Physical Therapy and Rehabilitation (Turkish - English Tracks),
Social Service (Turkish - English Tracks).

İÇİNDEKİLER / CONTENTS

Derleme Makaleler (Review Articles)

Effect of E-Sports Training on Hand Functions and Reaction Time in Young Adults: Randomized Controlled Study[*]

Gizem ERGEZEN[**], Ali Buğra KÖŞKER[***], Mert Eren SÖZERİ[****], Mertcan OKAN[*****],
Eray İNAN[******]

Abstract

Aim: To examine the effects of first-person shooter (FPS), a type of electronic sport that is increasingly popular, on reaction time, hand grip and pinch strength in healthy young adults when played regularly.

Method: Forty-four young adults with similar physical activity levels completed this randomized controlled prospective study. Participants were randomized into the study group (SG) (n=22) and the non-gaming control group (CG) (n=22). While SG played games with the AIM LAB program for 15 minutes a day for 4 weeks, CG did not do any practice. After the demographic characteristics of all participants were noted, their grip strength was evaluated with a hand dynamometer, pinch strength with a pinchmeter, and reaction time with the ruler drop test. All tests were repeated at the end of 4 weeks in SG and CG.

Results: The groups were similar in terms of demographic data and baseline evaluations (p>0.05). In SG, significant improvement was observed in strengths and reaction time after 4 weeks of practice compared to baseline (p<0.05). CG showed no improvements in terms of hand grip and pinch strength, and reaction time (p>0.05). There were significant differences between SG and CG in the changes in strength and reaction time values in 4 weeks long period (p<0.05).

Conclusion: FPS played regularly for four weeks led to improvements in reaction time, hand grip and pinch strength in young adults. Young adults who want to develop these functional components can play FPS regularly, even if they are not gamers.

Keywords: E-Sports, gamer, hand function, reaction time.

E-Spor Antrenmanının Genç Yetişkinlerde El Fonksiyonları ve Reaksiyon Zamanına Etkisi: Randomize Kontrollü Çalışma

Öz

Amaç: Popülaritesi gittikçe artan elektronik sporun bir türü olan birinci şahıs nişancı (FPS)'nin düzenli oynandığında sağlıklı genç erişkinlerde reaksiyon zamanı, el kavrama ve çimdik kuvvetine olan etkisini incelemektir.

Yöntem: Bu randomize kontrollü prospektif çalışmayı benzer fiziksel aktivite seviyelerindeki 44 genç yetişkin tamamladı. Katılımcılar çalışma grubu (ÇG)(n=22) ve oyun oynamayan kontrol grubuna (KG)(n=22) randomize edildi. ÇG 4 hafta boyunca, günde 15 dakikalık AIM LAB programı ile oyun oynarken, KG hiçbir uygulama yapmadı. Tüm katılımcıların demografik özellikleri not edildikten sonra başlangıç kavrama kuvvetleri el dinamometresi ile, çimdik kuvveti pinchmetre ile, reaksiyon zamanı Ruler Drop testi ile değerlendirildi. Tüm testlemeler ÇG ve KG'de 4 haftanın sonunda tekrarlandı.

Bulgular: Demografik veriler ve başlangıç değerlendirmeleri yönünden gruplar benzerdi (p>0,05). ÇG'de 4 hafta sonunda tüm parametrelerde başlangıca göre anlamlı iyileşme gözlendi (p<0,05). KG, el kavrama ve çimdikleme kuvveti ile reaksiyon süresi açısından herhangi bir gelişme göstermedi (p>0,05). Dört haftalık periyotta kuvvet ve reaksiyon süresi değerlerindeki değişimler açısından ÇG ve KG arasında anlamlı fark vardı (p<0,05).

Sonuç: Dört hafta boyunca düzenli olarak oynanan FPS, genç yetişkinlerde reaksiyon zamanı, el kavrama ve çimdik kuvvetinde iyileşmeye sebep olmuştur. Bu fonksiyonel bileşenleri geliştirmek isteyen genç yetişkinler, oyuncu olmasa da düzenli olarak FPS oynayabilir.

Anahtar Sözcükler: E-Spor, oyuncu, reaksiyon zamanı, el fonksiyonu.

Introduction

Thanks to its rapidly increasing momentum, technology has contributed to the emergence of developments in the field of sports, as in every field. Both playing competitive video games and watching the games with excitement have given rise to the concept of electronic sports (e-Sports)[1]. It is a branch that emerged in the 1990s as a result of the blending of the concepts of "game" and "sport". E-Sports can be defined as an organized sports branch in which individuals or teams compete with each other to achieve a certain goal through video games[1]. E-Sports is an online, interactive and multiplayer competition system that requires sensorimotor skills as in traditional team sports, as well as strategic skills such as tactics, logistics, team cooperation and analyzing the game situation[2]. In addition, this sport can be practiced in a virtual environment, it does not require serious physical resources in terms of equipment and facilities compared to other sports branches, it does not cause muscle fatigue, it is accessible, can be played individually or in teams, and most importantly, can be played in an organized manner with a team[3]. The most popular genres of e-Sports are first-person shooter (FPS), real-time strategy (RTS) and sports games. In FPS games, the virtual environment of the game is controlled with a virtual avatar, and the hand of this avatar and the tools they use appear on the screen[4].

New generation e-Sports allow players to demonstrate their skills more actively than ordinary computer games, to use the mouse and keyboard skillfully, and in addition to reveal strategic and tactical thinking skills[5]. It is known that games have positive features such as increasing attention, hand-eye coordination and multitasking abilities. It is also suggested that RTS games can improve cognitive function, and action games can be used as an exercise to increase reaction time[6].

Hand-eye coordination is the ability to process visual signals in the mind and create appropriate motor responses to the hand, such as reaching and grasping. This ability enables the hands and eyes to work in coordination, allowing us to maintain our daily functions. The developed ability is closely related to the person's daily independence, education and social success[7]. Reaction time is a concept related to hand-eye coordination that represents the time between receiving a sudden and unexpected stimulus and the minimal reaction given in response to the stimulus. Reaction time is a critical component to athlete success, the faster the reaction the individual is more likely to continue the game or avoid danger[8]. Shortening the reaction time improves response readiness and cognition[9].

There are many studies proving the natural connection between e-Sports and hand-eye coordination[10-12]. RTS, played 5-10 hours a week, increases the transfer effect, in which the information learned in one scenario can be used for different purposes in another scenario,[10] the change in the spatial perception of those who play FPS for 30 days is higher than those who do not play video games[11], and e-Sports has a significant effect on spatial perception and reaction time[12].

However, no studies have been found in the literature investigating how reaction time, hand grip and pinch strength are affected in young adults playing FPS. This randomized controlled study is planned to examine the effect of FPS e-sports on hand functions and reaction time. Our hypothesis is that e-sports will improve hand functions and reaction time.

Material and Methods

This prospective, randomized controlled study, based on volunteerism, completed by 44 healthy university students between the ages of 18-25, was conducted at Istanbul Medipol University between March 2022 and December 2023. This study was approved by the Non-Interventional Research Ethics Committee of Istanbul Medipol University (No: E-10840098-772.02-6695 Date: 27.12.2021). The procedures followed during the study were in accordance with the 2008 Declaration of Helsinki.

Male and female young adult students with similar physical activity levels who had not participated in any e-sports activities before, were included in the study. The International Physical Activity Questionnaire (IPAQ) was used to determine the physical activity levels of the participants and minimally active participants were included in the study. Those with cognitive problems, a history of injuries involving the hand, arm or shoulder that might interfere with evaluations and playing, or those with neuromuscular or musculoskeletal problems were excluded from the study. Of the 56 students who applied, 44 met the inclusion criteria and were included in the study. Participants were first categorized based on their voluntary engagement in e-sports activities. Those who actively participated in e-sports were considered potential candidates for the study group (SG), while those who did not play video games were considered for the control group (CG). Randomization was then performed separately within these two categories using a computer-generated random number sequence (www.random.org) to assign 22 students to each group. This approach ensured that participants were randomly allocated within their respective categories while maintaining the distinction between e-sports players and non-players.

Assessment

After the age, height, weight and gender characteristics of the individuals were noted, grip strength was measured with a hand dynamometer (*Baseline®Synamometer-Smedley Spring, NewYork, USA*), pinch strength was measured with a pinchmeter (*Baseline Hydraulic Pinch Gauge, Patterson Medical, Bolingbrook, IL*), and reaction time was evaluated with the ruler drop test. All tests were repeated at the end of 4 weeks in SG and CG.

Handgrip strength: The individual was seated on a chair with back support, with his feet flat on the ground, and the shoulder was positioned in adduction, the elbow in 90° flexion, and the forearm and wrist in neutral flexion and rotation. By applying maximum force for 3 seconds with the dominant hand, the device was asked to squeeze 3 times with 15-second intervals. The average of 3 trials was recorded and the force was measured in kilograms with an accuracy of 0.1 kg[13].

Pinch strength: Which is an important criteria for measuring hand fine motor skills, was evaluated with a pinchmeter in the standard position recommended by the American Association of Hand Therapists. Key pinch measurement was performed by sitting the individual upright on a chair with the shoulder in adduction and neutral rotation, the elbow in 90 degrees of flexion, and the forearm supported in neutral rotation. Three evaluations were made, with a 30-second rest between repetitions, and their average was taken as the outcome measure[14].

Reaction time: Ruler drop test is technically based on measuring the sum of reaction time and action time. In this test, the person to be tested was seated on a chair in a position where he could put his elbow on the edge of the table. The ruler was held perpendicular to the ground, parallel to the participant's thumb and index finger. After the tester gave the 'ready' command, assessor kept a random number between 1 and 3 in his mind, silently counted up to that number and left the ruler when the time was up. The participants were asked to hold the ruler as fast as they could and the number their thumb hit was noted. Each participant was given a period of habituation to the 3-repeat test, and then the test was repeated 12 times. For each participant, the 3 results with the fastest and slowest reactions were excluded from evaluation and the average of the other 6 results was taken and noted[15].

E-Sports Activity

AIM LAB program, one of the FPS games, has adopted a working principle that involves shooting rapidly at objects appearing on the screen and/or tracking those objects[16]. Players can often create their own playlist with various options within this program. In the 15-minute program we designed for this research; There were sphere tracking, plane shooting, detection, line tracking and reaction shooting options. The game was played by the study group for 4 weeks, everyday.

Game Scenario

Sphere tracking: Focuses on following the moving sphere as best as possible with the mouse cursor on the computer plane. For every second the mouse cursor is spent on the sphere, the user earns points (Fig. 1).

Figure 1. AIM LAB game, sphere tracking scenario

Plane shooting: Three targets appear randomly on the invisible plane on the screen. When one of the targets is hit, a new target appears and there are always three targets on the screen. Participants start by focusing on any of three targets, earning points for each target hit and losing points for each missed shot (Fig. 2).

Figure 2. AIM LAB game, shooting on the plane scenario

Detection: Focuses on measuring and training the speed of visually detecting targets in the field of view. As soon as the sphere appears on the screen, the left click of the mouse is pressed and points are earned; if it is clicked before the target appears on the screen, the user loses points (Fig. 3).

Figure 3. AIM LAB game, detection scenario

Line tracking: Focuses on following the line between two targets with the mouse cursor and points are earned for every second on the line. (Fig. 4)

Figure 4. AIM LAB game, line follow scenario

Statistical Analysis

Comparison and data analysis of the data collected in the baseline and final measurements were made using the statistical program "Statistical Package for Social Sciences" (SPSS version 23.0 (SPSS Inc., Chicago, IL USA). Descriptive statistics were used for demographic data and rates were expressed as "%". "Shaphiro-Wilks" test was used to investigate the suitability of the variables for normal distribution and it was determined that they did not show normal distribution. "Wilcoxon Signed Ranks" test was used to compare dependent groups and "Mann Whitney U" test was used to compare independent groups. Significance was accepted as less than 0.05 within the 95% confidence interval ($p < 0.05$).

According to the power calculation made with G-Power sample analysis, the power of our study reached 0.815 with a total of 44 participants ($\alpha = 0.05$, $d = 0.78$).

Results

Forty-four participants (23 female, 21 male) completed the study with 1:1 allocation into groups. Study group mean age was 20.10 years, control group mean age was 21.50 years. Study group participants had a mean height of 172.27 cm, whereas control group participants had a mean height of 176.50 cm. The study group had a mean weight of 66.41 kg, while the control group had a mean weight of 77.73 kg. The mean BMI in the study group was 22.17 kg/m², compared to 24.62 kg/m² in the control group. Sex distribution was balanced in both groups, with the study group consisting of 11 females and 11 males, and the control group consisting of 12 females and 10 males. Demographic data are presented in Table 1, showing no significant differences between groups in terms of age, height, weight, body mass index, and sex distribution (Table 1).

Table 1. Baseline characteristics of participants

	SG (n=22)	CG (n=22)	p
	Mean ± SD	Mean ± SD	
Age (years)	20.10 ± 1.34	21.50±1.06	0.436
Height (cm)	172.27 ± 9.24	176.50±11.94	0.131
Weight(kg)	66.41±15.35	77.73±22.66	0.086
BMI (kg/m²)	22.17±3.41	24.62±5.38	0.214
Sex (Female/Male)	(11/11)	(12/10)	0.763

Significance: p<0.05 Abbreviations: SG: Study group, CG: Control group, SD: Standard deviation

Table 2 presents the mean values and standard deviations of functional parameters such as hand grip and pinch strength, and reaction time measured at baseline and after 4 weeks for both the Study Group (SG) and Control Group (CG) without any additional practice. Within-group comparisons reveal significant improvements in all parameters for SG after 4 weeks compared to baseline (p<0.05). Conversely, CG did not demonstrate significant changes in hand grip, pinch strength, or reaction time over the 4-week period (p>0.05). Between-group analysis of the differences in these parameters at week 4 compared to baseline indicates a significant improvement in SG compared to CG (p<0.05).

Table 2. Comparison of functional parameters and measurements within and between study and control groups at baseline and 4 weeks

	SG (n=22) Mean ± SD			CG (n=22) Mean ± SD			Between group comparison
	Baseline	4 weeks	p	Baseline	4 weeks	p	
Hand grip strength	29.98±11.83	32.21±12.30	**0.008[w]**	33.61±9.41	33.79±9.26	0.363[w]	**0.046[u]**
Pinch strength	5.55±8.12	6.18±8.72	**0.011[t]**	4.38±1.61	4.56±1.55	0.068[t]	**0.026[T]**
Reaction time	13.82 ± 2.97	10.79 ± 1.55	**0.001[w]**	12.28±1.46	11.88±1.23	0.076[w]	**0.005[u]**

Significance: p<0.05 Abbreviations: SG: Study group, CG: Control group, SD: Standard deviation

[w]: Wilcoxon Signed Ranks, [t]:Paired Sample t-test, [u]:Mann Whitney U test, [T]:Independent Sample T-test

Discussion

In this study, the effect of FPS e-sports activity, performed for 15 minutes every day for 4 weeks, on hand functions and reaction time in university-aged adults with similar physical activity levels and who had never played FPS before, was examined. The results revealed that e-sports activity increased grip and pinch strength and improved reaction time. We think that this development is achieved by the game protocol, which provides hand-eye coordination and quick decision-making, and by increasing rapid response and motor firing by providing neural adaptation.

E-sports research to date includes physical and behavioral studies related to players' behavior, motivation and preferences, gaming behavior and choices, skills, mouse selection, keyboard dynamics and biomechanics in the gaming chair[17-19]. In addition to keeping individuals in poor postures for a long time, such a popular activity also has positive effects on hand-eye coordination, reaction time and cognition[6]. Playing FPS video games changes the neural processes that support spatial selective attention[20]. It has been shown that visual attention and cognitive skills are improved in individuals who play FPS video games and that there are behavioral changes compared to those who do not play[21]. To our knowledge, there is no study examining the hand functions and reaction times of individuals playing FPS. The specific effect of e-sports on hand functions and reaction time creates a gap in the literature. With this physical and

cognitive improvement, it can actually reveal its potential for use as a therapeutic and performance enhancer.

Bickmann et al. reported that e-Sports players and traditional athletes had similar reaction times. In addition, it has been shown that different types of games may affect abilities differently by requiring different reaction times, and different results can be obtained in acoustic and selective reaction tests[22]. For athletes, reacting quickly to a stimulus is seen as an important factor, especially in terms of preventing injuries and sports success, and is a parameter that needs to be improved. Another study examining fifty-three participants grouped according to whether they played more or less than 14 hours per week. While visual and aiming reaction times were better in players who played e-sports for more than 14 hours a week compared to those who played less, no difference was seen in auditory reaction time[23]. In our study, it was concluded that the reaction times of individuals who do e-sports improved compared to controls who did not do e-sports. These findings align with previous research indicating that engaging in activities such as FPS games can enhance various cognitive functions, including attention, spatial awareness, and perceptual-motor skills[24,25]. In sports fields, reaction time and predictive ability are critical aspects of perceptual abilities that are thought to be advantageous for a player's successful performance[26]. Our results therefore highlight the potential benefits of e-sports participation in improving reaction times in young adults; this can lead to increased performance and security in various competitive environments.

It is known that video game-based therapies applied to different diseases or healthy individuals improve hand functions, grip and pinch strength, and reaction time[27-30]. In our study, it was found that the FPS game, which requires mouse control and involves repetitive hand functions, increased reaction time, grip and pinch strength in the study group. When our results are combined with the literature showing that small-field games and video training can also be effective in increasing agility in athletic performance, we can say that e-Sports can be used to increase athletic performance[31]. Moreover, integrating our findings with literature suggesting that small-field games and video-based training can enhance agility in athletic performance, our study highlights the potential of e-Sports as a tool for improving overall athletic abilities. By emphasizing the specific benefits of FPS games in enhancing motor skills and reaction times, our results suggest that strategic incorporation of e-Sports into training regimens could potentially optimize athletic performance across different sports disciplines. Future studies could explore these benefits further and consider the broader implications of e-Sports in sports science and performance enhancement strategies.

Limitation in this study, which suggests that FPS games can therapeutically increase physical fitness and reaction time, is that the development mechanisms were not examined and they were not tested in different pathology situations. Finally, we cannot generalize our findings to all healthy young adults. More studies need to be conducted using larger sample sizes and measurements expressing performance parameters.

Future research can further explore the underlying mechanisms and long-term effects of FPS games on physical health and athletic performance, providing valuable information for both players and practitioners in the sports and rehabilitation fields.

Conclusion

As a result, FPS played regularly for 4 weeks caused improvements in reaction time, hand grip and pinch strength. This study may shed light on future studies in the field of e-Sports. This could pave the way for innovative approaches to using e-sports as a tool to improve motor skills and cognitive abilities beyond its gaming aspect.

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Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin Türkçe Geçerlik ve Güvenirlik Çalışması

Cemal ÖZALP*

Öz

Amaç: Bu çalışma, Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin Türkçe geçerlik ve güvenirliğini test etmek amacıyla gerçekleştirildi.

Yöntem: Metodolojik tipte gerçekleştirilen çalışma, bir devlet üniversitesi hastanesinde Ocak-Mart 2024 tarihleri arasında yürütüldü. Araştırmanın çalışma evreninden olasılıksız rastlantısal örneklem yöntemiyle seçilen ve dahil edilme kriterlerini karşılayan 405 hemşireye ulaşıldı. Veriler, 'Bireysel Bilgi Formu' ve 'Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği' kullanılarak toplandı. Araştırmada frekans, yüzde, ortalama ve standart sapma gibi tanımlayıcı istatistikler, AFA ve DFA grupları arasındaki farklar ki-kare testleri kullanılarak analiz edildi.

Bulgular: Ölçeğin çeviri-geri çeviri yöntemi kullanılarak dil uyarlaması sağlandı. Kapsam Geçerlik İndeksi 0,96 bulundu. Kaiser-Meyer-Olkin değeri 0,945; Bartlett's değeri χ2=8982.715, p<0,001 hesaplandı. Model uyum incelemesinde uyum indekslerinin kabul edilebilir sınırlarda olduğu saptandı. Ölçeğin iç tutarlılık α katsayısı .953 bulundu.

Sonuç: Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin Türk dili ve kültürüne uygun, geçerli ve güvenilir bir ölçek olduğu belirlendi.

Anahtar Sözcükler: Kişi merkezli, palyatif bakım, hemşire, geçerlik, güvenlik.

Turkish Validity and Reliability Study of the Person-Centered Palliative Care Nursing Scale

Abstract

Aim: This study was conducted to test the validity and reliability of the Person-Centered Palliative Care Nursing Scale in Turkish.

Method: The methodological study was conducted in a state university hospital between January and March 2024. 405 nurses who were selected from the study universe using the improbable random sampling method and met the inclusion criteria were reached. Data were collected using the 'Individual Information Form' and the 'Palliative Care Nursing Scale for Person-Centered Care'. Descriptive statistics such as frequency, percentage, mean and standard deviation were analyzed in the study, and differences between EFA and CFA groups were analyzed using chi-square tests.

Results: The scale was adapted for language use using the translation-back translation method. The Content Validity Index was found to be 0.96. Kaiser-Meyer-Olkin value was calculated as 0.945; Bartlett's value was χ2=8982.715, p<0.001. In the model fit examination, it was determined that the fit indices were within acceptable limits. The internal consistency α coefficient of the scale was found to be .953.

Conclusion: It was determined that the Person-Centered Palliative Care Nursing Scale is a valid and reliable scale suitable for Turkish language and culture.

Keywords: Person-centered, palliative care, nurse, validity, safety.

Giriş

Dünya Sağlık Örgütü (WHO), palyatif bakımı, yaşamı tehdit eden hastalıklarla mücadele eden yetişkin ve çocuk hastalar ile ailelerinin yaşadığı acıları hafifletmeyi ve önlemeyi amaçlayan yaşam kalitesini iyileştiren bir yaklaşım olarak tanımlamıştır[1]. Palyatif bakım, insan merkezli sağlık hizmetlerinin çok önemli bir parçasıdır. Fiziksel, psikolojik, sosyal veya ruhsal olarak, sağlıkla ilgili ciddi acıları gidermek küresel bir etik sorumluluktur[2]. Palyatif bakım, yaşamın sonuna yaklaşan bireylerin yanı sıra ağır hastalık nedeniyle sağlıkla ilgili ciddi ızdırap çeken her yaştan bireyin bütüncül bakımını sağlar[3].

Geçmişten günümüze hemşirelerin palyatif bakım sağlamadaki yetkinliklerini değerlendirmek için çeşitli araçlar geliştirilmiştir[4]. Kişi merkezli palyatif bakım, hastanın ve hemşirelerin, hastanın anlam, haysiyet, sıkıntıdan kurtulma, değerlerini ve inançlarını doğrulamasına yardımcı olabilecek herhangi bir fikri ifade etmekte özgür olduğu bir diyaloğa katılımı varsayılmaktadır[5]. Kişi merkezli bakım, tıbbi personel ve hastalar arasında karşılıklı güvene dayalı terapötik iletişimi sağlayan kapsamlı bakım sağlamak için tüm klinik karar verme süreçlerinde bireysel hastaların talep ve değerlerine saygı duyma ve bunlara yanıt verme kavramını ifade eder. Hemşirelerin mesleki bağlılığı ve kişinin görevlerinin değerine olan güçlü inancı, kişi merkezli bakım uygulayan hemşirelerin özelliklerinden bazılarıdır[6]. Hemşirelik değerlerine bağlı olduğu için kişi merkezli bakım uygulamasında temel bir unsurdur. Bu unsur hemşirelerin klinik alandaki problem çözme yeteneklerini geliştirir[7] ve kaliteli hemşirelik bakımı sağlamaktadır. Hemşireler bakımı ciddiye almalı ve ölümcül hastalar için kişi merkezli bakım uygulama yeteneklerine belirli bir miktar güven duymaları gerektiğinden[8] palyatif hastalara bakım sağlayan hemşirelerin hemşirelik profesyonelliği daha fazla araştırma gerektirir. Hastaya bakımını kişi merkezli yaratma şansı vermek, bakımın kişi merkezli ve değerlerine, inançlarına ve tercihlerine göre uyarlanma olasılığını artırmaktadır[9]. Bir kişinin psikolojik, sosyal ve ruhsal deneyimlerini ortaya çıkaran kişi merkezli bakım, bireyin değerlerinin, inançlarının ve tercihlerinin çeşitli yönlerini tanıyan ve dikkat çeken kişi merkezli bakıma katkıda bulunabilir[10]. Ancak, kişi merkezli palyatif bakım hemşireliği ölçen bir araç eksikliği bulunmaktadır[9].

Kişi merkezli palyatif bakım için 6S modeli Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin geliştirilmesine rehberlik etmiştir. Österlind ve Henoch (2021) modellerinde çok önemli olan altı kavramı tanımladı. Bunlar şunları içeriyordu: 1) Benlik imajı, kişinin kimliğini yansıtan ve hastalık ve ölüme rağmen, bir kişinin mümkün olduğunca olumlu bir bakış açısını koruyabilmesi gerektiği fikriyle ilgili temel kavramdır; 2) Semptom rahatlaması öncelikle fiziksel ıstırabı ele alır. Semptomlar, hastalığı olan kişilerin neden tıbbi yardım almalarında önemli bir faktördür, bu nedenle semptom deneyimlerini sağlık hizmeti sağlayıcılarıyla tartışmaları mantıklıdır; 3) Arkadaşlık ihtiyacı gibi sosyal ihtiyaçlar, sosyal ilişkilerine yansır; 4) Sentez ve seçimi; 5) Stratejiler varoluşsal ve ruhsal gereksinimleri yansıtır. 6) Kendi kaderini tayin etme, bir bireyin hayata aktif olarak katılmak ve öbür dünya için kendi rotasını şekillendirmek de dahil olmak üzere psikolojik taleplerini temsil eder. Bu model, kişi merkezli palyatif bakım olurken, bir kişinin kalan günlerini, ne kadar kısa veya uzun olursa olsun, mümkün olduğunca tam olarak yaşama şansını en üst düzeye çıkarmayı amaçlamaktadır[5].

Yapılan literatür incelemesinde, ülkemizde hemşirelerin kişi merkezli palyatif bakımın sunumunu değerlendirmeyi ölçecek bir ölçüm aracının olmaması ve ulusal literatürde olan boşluğu doldurması açısından bu çalışmanın önemli olduğunu göstermektedir. Bu çalışmada, hemşirelerin kişi merkezli palyatif bakımı sunumunu ölçmek amacıyla, Türkçe geçerlik ve güvenirlik çalışması yapılarak ulusal literatüre geçerli ve güvenilir bir ölçek kazandırılması amaçlanmaktadır. Bu amaç doğrultusunda aşağıdaki sorulara cevap arandı:

Türkçe uyarlanması yapılan Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği geçerli midir?

Türkçe uyarlanması yapılan Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği güvenilir midir?

Gereç ve Yöntem

Araştırma Tipi

Bu çalışma, orijinal olarak Soriano ve arkadaşları[9] tarafından 2023 yılında geliştirilen Kişi Merkezli Palyatif Bakım Hemşireliği yetkinliklerini ölçmek amacıyla metodolojik tipte gerçekleştirildi. Çalışma bir üniversite hastanesinde Ocak-Mart 2024 tarihleri arasında yürütüldü.

Evren ve Örneklem

Geçerlik-güvenirlik çalışmasının verileri tek bir evrene genellenemeyeceğinden dolayı, çalışmanın evrenini belirlemeye gerek görülmemektedir. Örneklem büyüklüğünün belirlenmesinde farklı fikirler bulunmakla birlikte[11], ölçek araştırmalarında örneklem büyüklüğünün belirlenmesinde ölçek madde sayısının en az 5 katı mümkünse 10 katı olması gerektiği belirtmektedir[12]. Örneklem büyüklüğü, faktör analizinin genel kuralı ile belirlendi, bunun için madde başına en az 10 katılımcı ve %20 örneklem kaybı olabileceğini düşünerek hesaplandı[13]. Bu bilgiler ışığında, 36 maddelik Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin geçerlik ve güvenirlik analizleri için 360 (20 madde x10) hemşire ile çalışmanın tamamlanmasına karar verildi. Verilerin %10'unun kayıp olabileceği göz önüne alınarak 396 hemşire ile çalışması hedeflendi. Bu çalışma, araştırmaya katılmayı kabul eden 405 hemşire ile yürütüldü.

Veri Toplama

Etik kurul izni alındıktan sonra çalışmanın yapılacağı kurumdan çalışmanın kurum izni alındı. Veriler, Ocak-Mart 2024 tarihleri arasında toplandı. Çalışmaya, bir üniversite hastanesinin farklı kliniklerinde çalışan ve çalışmaya dahil olmayı kabul eden tüm hemşireler katıldı. Veri toplama, yüz yüze anket yöntemiyle toplandı. Hemşirelerin anketi doldurulması için 15-30 dakikalık bir süre verildi ve bilgilendirilmiş onamları alındı.

Veri Toplama Araçları

Veriler, "Bireysel Bilgi Formu" ve Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin dil geçerliği yapılmış hali kullanılarak toplandı.

Bireysel Bilgi Formu

Araştırmacılar tarafından literatür doğrultusunda[9] oluşturulan, hemşirelerin sosyo-demografik ve çalışma özelliklerinden oluşan, yaş, cinsiyet, medeni durum, eğitim düzeyi, çalışma deneyimi, çalışma şekli, çalışılan birim ve ölümcül hastaya bakma deneyimi ile alakalı sekiz soru bulunmaktadır.

Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği

Ölçek Soriano ve arkadaşları[9] tarafından ile hemşirelerin kişi merkezli palyatif bakımını değerlendiren bir araç geliştirmek amacıyla 2023 yılında geliştirilmiştir. Ölçek 37 maddeden oluşmaktadır. Maddeler, 5 puanlık bir Likert ölçeğinde ölçüldü. (EFA, Exploratory Faktör Analysis) üç faktör verdi: 1) Kişinin haysiyetini korumakla ilgilenmek (13 madde), 2) kişinin özerkliğini güçlendirmekle ilgilenmek (14 madde) ve 3) kişinin anlık endişelerini anlamakla ilgilenmek (10 madde). Bu alt ölçeklerin iç tutarlılık güvenilirliği mükemmel görünse de (yani sırasıyla 0,95; 0,96 ve 0,93), genel ölçek için Cronbach'ın alfası 0.98'dir. Öğe-toplam korelasyon katsayıları tüm kalemler için 0,310 ile 0,76 arasında değişen >0,30'dur.

Verilerin Değerlendirilmesi

Toplanan veriler SPSS (Statistical Package for Social Sciences) 29.00 ve AMOS (Analysis of Moment Structures) 22.0 ile analiz edildi. Katılımcı özellikleri frekans, yüzde, ortalama ve standart sapma gibi tanımlayıcı istatistiklerle incelendi; AFA ve DFA grupları arasındaki farklar ise ki-kare testleriyle değerlendirildi. AFA'da, anlamlı yapıları çıkarmak için maksimum olasılık yöntemi kullanıldı. Faktör yapısının yorumlanmasını kolaylaştırmak için, Varimax rotasyon yöntemi kullanılarak faktör rotasyonu gerçekleştirildi. Verilerin faktör analizi uygunluğu Kaiser-Meyer-Olkin (KMO) ve Bartlett sferiklik testleriyle değerlendirildi. DFA 'da uyum indeksleri; AMOS 20.0 programı kullanılarak değerlendirildi. Yakınsak ve diskriminant geçerliği hesaplandı. Ölçeğin güvenirliği, Cronbach α ve madde toplam puan korelasyonları ile değerlendirildi.

Araştırmanın Etik Yönü

Orijinal ölçeği geliştiren Soriano'dan ölçeğin Türkçe'ye uyarlanması ve kullanılması için e-posta aracılığı ile izin alındı. Daha sonra bir devlet üniversitesinin Bilimsel Araştırma ve Yayın Etiği Kurulundan (11.12.2023 tarih ve 120970 numaralı kararı) onay alındı. Çalışmanın yapılabilmesi için bir devlet üniversitesi hastanesinden kurum izni alındı. Çalışmaya dahil olan klinik hemşirelerine çalışmanın amacı ve çalışmanın gönüllülük esası oluşturduğu açıklanarak, hemşirelerin sözlü ve yazılı onamları alındı.

Bulgular

Dil Geçerliliği

Dil geçerliğini değerlendirmek için 'Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği' çeviri-geri çeviri tekniği kullanıldı. Öncelikle, ölçeğin İngilizce versiyonu, hemşirelik alanında uzman 10 kişi tarafından Türkçe'ye çevrildi. Uzmanlar tarafından yapılan çeviri sürecinin ardından araştırmacılar, ölçek maddeleri için en uygun ifadeleri belirledi ve tek bir Türkçe form oluşturdu. Sonrasında, bu oluşturulan form, İngilizce dil uzmanı tarafından İngilizce'ye geri çevrildi. Geri çevrilen form ile ölçeğin orijinal formunun

maddeleri karşılaştırıldı ve her iki formun uyum sağladığı görüldü. Çeviri sonrası oluşturulan form, Türk Dili ve İngiliz Dili uzmanlarının görüşüne sunuldu.

Kapsam Geçerliği

Kapsam geçerlik indeksi Davis tekniği kullanılarak hesaplandı[14]. İstatistiksel olarak elde edilen değerlerin 0,75 veya üzerinde olması beklenmektedir. Ayrıca, tüm maddelerin KGİ değerlerinin toplam madde sayısına bölünmesiyle hesaplanan Kapsam Geçerlik Oranı (KGO) değerinin 0,80'in üzerinde olması gerekmektedir[14]. Kapsam geçerliği için 10 uzmanın ölçekte yer alan sorulara yönelik görüşleri incelendi. Bu değerlendirme sonucunda, 20. madde için KGİ değerinin 0,60 olduğu belirlendi. Diğer 36 madde ise KGİ değerleri 0,80 ve üzerindeydi. Bu nedenle, 20. Madde ölçekten çıkarıldı. Kapsam Geçerlik İndeksi 0,96 bulundu. Uzman değerlendirmelerinin ardından ölçeğin dil uygunluğu, yazım ve imla hataları ile ölçek maddelerinin anlaşılırlığı açısından düzeltmeleri değerlendirmek amacıyla pilot uygulama yapıldı. Ölçek maddelerinin anlaşılırlığını ve ifadelerin okunabilirliğini belirlemek amacıyla, ana örneklemle benzer özelliklere sahip bir gruba pilot uygulama yapılması gerekmektedir[15]. Pilot uygulama için önerilen örneklem genellikle %10'u veya 30 kişi kadar olmalıdır[16]. Bu doğrultuda, araştırmaya gönüllü olarak katılan ve ana örneklemle benzer özelliklere sahip 50 hemşire üzerinde gerçekleştirildi. Hemşirelerden ölçek maddelerine düzeltme ve öneri gelmemesi sebebiyle ölçeğin taslak formuna son hali verilmiş ve asıl örneklem grubuna ölçek uygulandı. Pilot uygulamadan elde edilen veriler analizlere dahil edilmedi.

Katılımcıların Tanıtıcı Özellikleri

Araştırmada Açımlayıcı Faktör Analizi (AFA) grubunun %72'sinin 30 yaş altında, %63,8'inin kadın, %58,8'inin bekâr, %67,9'unun lisans mezunu, %60,9'unun 5 yılın altında çalışma süresinin olduğu belirlenmiştir. Hemşirelerin %59,7'sinin gündüz+nöbet şeklinde çalıştığı, %31,7'sinin diğer kliniklerde görev aldığı ve %59,7'sinin 1-5 yıl ölümcül hastaya bakım deneyiminin olduğu saptandı. Doğrulayıcı Faktör Analizi (DFA) grubunun %71,8'inin 30 yaş altında, %58,4'ünün kadın, %57,9'unun bekar, %69,3'ünün lisans mezunu, %61,9'unun 5 yılın altında çalışma süresinin olduğu belirlendi. Hemşirelerin %57,9'unun gündüz+nöbet şeklinde çalıştığı, %33,7'sinin diğer kliniklerde görev aldığı ve %61,4'ünün 1-5 yıl ölümcül hastaya bakım deneyiminin olduğu saptandı. Gruplar arasında anlamlı bir fark tespit edilmedi (p>0.05).

Tablo 1. AFA ve DFA Gruplarının Tanımlayıcı Özelliklerinin Karşılaştırılması

	AFA (n=243)	DFA (n=202)	χ^2 (*p*)
Yaş Grup			0,070 (0,966)
<30	175 (72,0)	145 (71,8)	
31-45	64 (26,3)	53 (26,2)	
>46	4 (1,6)	4 (2,0)	
Cinsiyet			
Kadın	155 (63,8)	118 (58,4)	1,342 (0,282)
Erkek	88 (36,2)	84 (41,6)	
Medeni Durum			
Bekar	143 (58,8)	117 (57,9)	0,039 (0,847)

Evli	100 (41,2)	85 (42,1)	
Eğitim Durumu			
Lise	13 (5,3)	14 (6,9)	1,540 (0,673)
Ön lisans	28 (11,5)	17 (8,4)	
Lisans	165 (67,9)	140 (69,3)	
Lisansüstü	37 (15,2)	31 (15,3)	
Çalışma Yılı			
<5	148 (60,9)	125 (61,9)	0,402 (0,940)
6-10	63 (25,9)	54 (26,7)	
11-15	22 (9,1)	15 (7,4)	
>16	10 (4,1)	8 (4,0)	
Çalışma Şekli			
Gündüz	66 (27,2)	59 (29,2)	0,229 (0,892)
Gündüz+Nöbet	145 (59,7)	117 (57,9)	
Vardiya	32 (13,2)	26 (12,9)	
Çalışılan Birim			
Dahili	44 (18,1)	31 (15,3)	3,465 (0,629)
Cerrahi	34 (14,0)	21 (10,4)	
Yoğun Bakım	36 (14,8)	36 (17,8)	
Acil	40 (16,5)	39 (19,3)	
Palyatif	12 (4,9)	7 (3,5)	
Diğer	77 (31,7)	68 (33,7)	
Ölümcül hastaya bakma deneyimi			
1-5	145 (59,7)	124 (61,4)	0,528 (0,768)
6-10	28 (11,5)	19 (9,4)	
Yok	70 (28,8)	59 (29,2)	

Not: DFA, doğrulayıcı faktör analizi; AFA, açımlayıcı faktör analizi.

Açımlayıcı Faktör Analizi

Ölçeğin KMO değeri 0,945 ve Bartlett Sphericity testinin anlamlı olduğu saptandı ($\chi 2$ =8982,715 p<0,001), verilerin AFA için uygun olduğunu göstermektedir.

İlk yapılan AFA'da ölçeğin 14., 17., 18. ve 21. maddeleri binişik madde özelliği gösterdiği için ölçekten çıkarıldı. Tekrarlanan faktör analizi sonucunda açıklanan toplam Varyans %55.901 olduğu belirlendi. AFA sonucunda öz değeri 1'i aşan üç faktörlü yapı elde edildi. Faktör yüklerinin .441-.793 arasında olduğu; birinci faktörün 11 maddeden oluştuğu ve açıkladığı varyansın %19.646 olduğu belirlendi. Faktör 2'nin, 11 maddeden oluştuğu ve açıkladığı varyans %19.270 olduğu belirlendi. Faktör 3'ün, on maddeden oluştuğu ve açıkladığı varyans %16.985 olduğu belirlendi.

Tablo 2. AFA sonuçları (n=243)

Maddeler	Faktör 1	Faktör 2	Faktör 3	Düzeltilmiş Madde-Toplam Korelasyonu
K4	,793			0,642
K3	,791			0,565
K2	,721			0,615
K9	,670			0,655
K10	,664			0,579
K7	,663			0,620
K12	,620			0,722
K13	,605			0,695
K6	,561			0,644
K15	,482			0.689
K1	,476			0,503
K34		,754		0,672
K28		,746		0,609
K35		,745		0,669
K30		,707		0,416
K33		,695		0,697
K29		,649		0,637
K32		,628		0,678
K36		,625		0,491
K27		,616		0,684
K23		,523		0,594
K22		,493		0,574
K24			,633	0,600
K19			,626	0,652
K26			,602	0,665
K20			,595	0,591
K8			,584	0,625
K31			,574	0,700
K11			,543	0,471
K25			,517	0,647
K16			,490	0,680
K5			,441	0,551
Eigenvalue	6.287	6.166	5.435	
Explained variance (%)	19.646	19.270	16.985	
Total explained variance (%)		55.901		

DFA 32 madde ve üç faktörlü yapı üzerinde, daha önce AFA ile belirlenmiş yapıyı doğrulamak amacıyla, 202 hemşire ile gerçekleştirildi. 32 maddelik ölçeğin standardizasyon katsayılarının 0,50'nin üzerinde olduğu tespit edildi ve DFA uyum indekslerinin kabul edilebilir düzeyde olduğu belirlendi. CMIN/DF=2.428, RMSEA= 0.78, CFI= 0.92, TLI= 0.94, NFI=0.93, AGFI=0.90 olduğu belirlendi. Bu uyum indeksleri, faktör modelinin uygunluğunu ve AFA sonuçlarını doğrulamaktadır.

Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği için yakınsak ve ayırıcı geçerliğini doğrulamak için AVE, CR değerleri hesaplandı. Her bir faktör için incelenen AVE değerleri 0,46 ile 0,55 arasında değişti. CR değerlerinin ise 0,89 ile 0,93 arasında olduğu tespit edildi.

Tablo 3. DFA Sonuçları

Faktör	Maddeler	Tahmin	Standart Hata	Kritik Oran	Bileşik Güvenirlik	Ortalama Açıklanan Varyans
1	K1	0,61			0,93	0,55
	K2	0,745	0,118	8,665		
	K3	0,714	0,123	8,389		
	K4	0,75	0,12	8,701		
	K6	0,784	0,114	8,982		
	K7	0,771	0,124	8,876		
	K9	0,744	0,122	8,66		
	K10	0,702	0,117	8,291		
	K12	0,822	0,127	9,28		
	K13	0,762	0,125	8,809		
	K15	0,718	0,132	8,434		
2	K22	0,583			0,91	0,53
	K23	0,621	0,152	7,266		
	K27	0,759	0,151	8,334		
	K28	0,75	0,162	8,272		
	K29	0,725	0,15	8,089		
	K30	0,558	0,174	6,71		
	K32	0,75	0,148	8,275		
	K33	0,801	0,138	8,62		
	K34	0,818	0,16	8,731		
	K35	0,796	0,16	8,59		
	K36	0,567	0,191	6,792		
3	K8	0,697			0,89	0,46
	K11	0,559	0,1	7,563		
	K16	0,758	0,107	10,126		
	K19	0,686	0,108	9,221		
	K20	0,639	0,124	8,613		

Faktör	Maddeler	Tahmin	Standart Hata	Kritik Oran	Bileşik Güvenirlik	Ortalama Açıklanan Varyans
	K26	0,737	0,1	9,888		
	K31	0,743	0,113	9,964		
	K24	0,653	0,114	8,8		
	K25	0,716	0,104	9,578		
	K5	0,599	0,127	8,096		
Fitness index	CMIN/DF	RMSEA	CFI	TLI	NFI	AGFI
Reference value	<3.0	<.08	>0.90	>0.90	>0,90	>0,90
Model	2.428	0.78	0.92	0.94	0,93	0,90

İç Tutarlılık

Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeğinin güvenirliği değerlendirildiğinde; üç faktörlü ölçek için iç tutarlılık katsayısı .953, alt ölçeklerin iç tutarlılık katsayıları; birinci alt boyut için .922, ikinci alt boyut için .905, üçüncü alt boyut için .884 olarak belirlendi. Ayrıca madde toplam puan korelasyonuna bakıldığında, ölçek maddelerinin düzeltilmiş madde toplam puan korelasyonları 0.471 ile 0.722 arasında olduğu belirlendi (Şekil 1.).

Şekil 1. Path Diyagramı
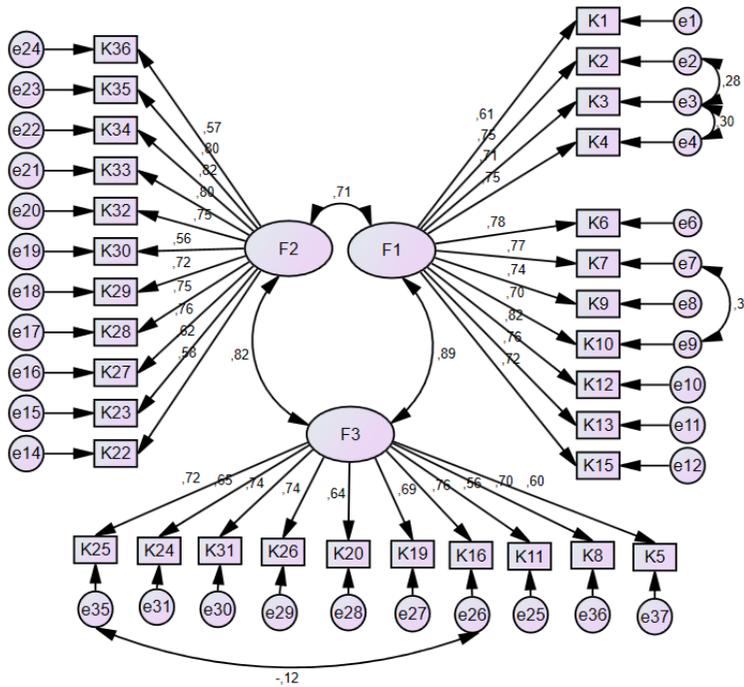
Tartışma

Bu çalışmada Soriano ve arkadaşları (2023) tarafından[9] geliştirilen ölçeğin Türkçe geçerlik ve güvenirliği yapıldı. Hemşirelerin kişi merkezli palyatif bakımını değerlendirmek amacıyla 37 madde ve 3 alt boyuttan oluşan ölçek incelendi.

Geçerlik, bir aracın ölçmek istediği şeyi ölçüp ölçmediğini ifade eder[17]. Psikometrik araçlardaki maddelerin anlaşılırlığı ve uygulanabilirliği konusunda uzmanların fikir birliği sağlaması, ölçeğin içerik geçerliği için bir kriter olarak kabul edilmektedir[18]. Literatürde çevirinin hem ölçeğin orjinal diline hem de uyarlanan dile hâkim, kültürel ve dilsel özelliklerini anlayan iki veya daha fazla bağımsız kişi tarafından yapılması önerilmektedir[19]. Bu çalışmada ölçeğin orijinal hali öncelikle İngilizce ve Türkçe bilen bağımsız çevirmenler tarafından çevrilmiştir. Türkçeye çevrildikten sonra ölçeğin ve maddelerinin kapsam geçerliği incelenmiştir. Literatürde önerildiği gibidir[14].

Bu çalışmada analiz öncesinde KMO ve Bartlett testleri uygulanmıştır. KMO değerinin 0,5'ten büyük olması verilerin normal dağılıma sahip olduğunu kabul etmek için yeterli kabul edilmekte ve bu nedenle açımlayıcı faktör analizi için uygun görülmektedir. Bartlett küresellik testinin anlamlı olması, verilerin faktör analizi için de yeterli olduğunu göstermektedir[20]. Bu çalışmada ölçeğe ait KMO değeri 0.945 ve Bartlett Sphericity testinin anlamlı olduğu saptandı ($\chi 2$ =8982,715 p<0.001), verilerin AFA için uygun olduğunu göstermektedir. Bu değerlere göre verilerin faktör analizine uygun olduğu görülmektedir.

Faktör analizi iki farklı yöntemle gerçekleştirilir: Açımlayıcı Faktör Analizi (AFA) ve Doğrulayıcı Faktör Analizi (DFA)[21]. Kültürlerarası ölçek uyarlama çalışmalarında, orijinal faktör yapısından farklı bir yapı elde edilme olasılığı nedeniyle, DFA öncesinde AFA yapılmadan önce yeterince DFA'nın yapılmasının yeterli olduğu belirtilmektedir[22]. DFA, mevcut bir ölçeğin veya modelin faktör yapısının doğrulanıp doğrulanmadığını test etmek için kullanılır[21]. DFA yapıldığında, uyum iyiliği indekslerine, faktör yüklerine ve t istatistiklerine bakılması, ayrıca Path Diyagramı oluşturulması önerilir. Uyum iyiliği indeksleri incelendiğinde, belirli bir düzeyde olmaları beklenir. $\chi 2$ (CMIN/DF) değeri üç ve altında "mükemmel uyum", beş ve altında "kabul edilebilir uyum" olarak değerlendirilir. CFI ve IFI ölçütü 0,95 ve üzeri "mükemmel uyum", 0,85 ve üzeri "kabul edilebilir uyum" olarak kabul edilir. NFI ölçütü 0,95 ve üzeri "mükemmel uyum", 0,80 ve üzeri "kabul edilebilir uyum" olarak kabul edilir. GFI, AGFI ve TLI ölçütü 0,90 ve üzeri "mükemmel uyum", 0,80 ve üzeri "kabul edilebilir uyum" olarak kabul edilir. RMSEA ve RMR ölçütü ise 0,05 ve altında "mükemmel uyum", 1,00 ve altında "kabul edilebilir uyum" olarak kabul edilir[23,24]. Ölçeğin faktör yükleri değerlendirildiğinde, alt boyut ve maddeler arasındaki faktör yüklerinin 0,30 ve üzerinde olması aranır. 0,30'un altında faktör yükü alan maddelerin çıkarılması tavsiye edilir[25]. Bu bilgiler doğrultusunda; ölçeğe DFA uygulandı. DFA 32 madde ve üç faktörlü yapı üzerinde, AFA da dâhil edilmeyen 202 hemşire ile gerçekleştirildi. 32 maddelik ölçeğin standardizasyon katsayılarının 0,50'nin üzerinde olduğu tespit edildi. DFA uyum indekslerinin kabul edilebilir düzeyde olduğu belirlendi. $\chi 2$ (CMIN/DF) değeri 2,428; RMSEA değeri 0,78; CFI değeri 0,92; TLI değeri 0,94; NFI değeri 0,93; AGFI değeri 0,90 olarak saptandı. Seçilen uyum indeksleri, faktör modelinin iyi bir uyum sağladığını ve AFA'nın sonuçlarını doğruladığını gösterdi.

Cronbach Alpha katsayısı, maddelerin iç tutarlılığının bir ölçüsü olarak kabul edilir; ancak ölçekte yer alan maddelerin homojen yapısını değerlendirmek için kullanılır. Likert tipi ölçeklerde sıklıkla kullanılan Cronbach Alpha değeri 0.40'ın altındaysa güvenirlik düşüktür, 0,40 ile 0,60 arasındaki değerler düşük güvenirlik, 0,60 ile 0,80

arasındaki değerler orta güvenirlik ve 0,80 ile 1,00 arasındaki değerler ise yüksek güvenirlik olarak değerlendirilir[26]. Soriano ve arkadaşlarının çalışmasında[9] toplam ölçek için Cronbach'ın alfa katsayısı 0,977'dir ve karşılık gelen faktörlerin her biri için katsayılar Faktör 1 için 0.953, Faktör 2 için 0.961 ve Faktör 3 için 0.932 idi. Bu sonuçlar çalışmada elde edilen bulgulara benzerlik göstermektedir. Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeğinin güvenirliği değerlendirildiğinde; üç faktörlü ölçek için iç tutarlılık katsayısı .953, alt ölçeklerin iç tutarlılık katsayıları; birinci alt boyut için .922, ikinci alt boyut için .905, üçüncü alt boyut için .884 olarak belirlendi. Sonuç olarak, ölçeğin iç tutarlılığının güvenilir olduğu söylenebilir. Madde-toplam korelasyonlarının negatif olmaması ve 0,25'ten büyük olması beklenir. Ayrıca, bir maddenin ölçekten çıkarılması durumunda elde edilen alfa katsayısının, ölçeğin genel alfa katsayısına göre artması, bu maddenin ölçeğin güvenilirliğini azalttığını gösterir ve bu madde ölçekten çıkarılmalıdır[27]. Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeğinin maddelerin hepsinin madde- toplam korelasyonları 0,471 ile 0,722 arasında olduğu ve ölçek maddelerinin güvenirlik açısından uygun olduğu, çünkü madde-toplam korelasyonları 0,25'ten büyüktür. Ayrıca, ölçekten madde çıkarıldığında alfa katsayısının artmaması, ölçek maddelerinden herhangi birinin çıkarılmasına gerek olmadığını göstermektedir.

Sonuç ve Öneriler

Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin 36 madde ve 3 alt boyuttan oluşan Türkçe versiyonu, ölçeğin orijinal versiyonu ile iyi düzeyde AFA ve DFA uyumu gösterdi. Ölçeğin 3 faktörlü yapısı sonuçlarla doğrulandı. Ölçeğin Cronbach α katsayısı, madde-toplam korelasyonu ve test-tekrar test analizi yeterli kabul edildi. Sonuçlar, Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin hemşireler için kişi merkezli palyatif bakımı ölçmek için geçerli ve güvenilir bir araç olduğunu saptandı. Kişi Merkezli Palyatif Bakım Hemşireliği Ölçeği'nin hemşirelik alanındaki boşluğu dolduracağı düşünülmektedir. Ölçeğin maddeleri değerlendirildiğinde, amaçlarına uygun olması durumunda diğer bilim alanlarındaki araştırmacılar tarafından da kullanılabilir.

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The Ethical Evaluation of Social Work Academic Publications with Children and Youth: Meta Analysis[*]

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Abstract

Aim: This research aimed to examine the adherence to ethical principles and standards in academic social work publications focusing on children and youth.

Method: To achieve the research objective, the meta-analysis method was employed. Out of 737 studies, including articles and theses, 192 studies met the inclusion criteria. Using the predetermined coding method, the studies were analyzed based on their form and content characteristics, their adherence to ethical principles and standards was evaluated. Effect sizes were then calculated accordingly. For this calculation, the group difference meta-analysis method was applied, which compares naturally occurring groups, such as men and women, to determine standardized effect sizes. Additionally, Hedges's g value was utilized for effect size estimation, and the random effects model was chosen to account for variability across studies.

Results: The study found that Hedges's g value indicated a small effect size across perceptions. This finding suggests that the difference in ethical principles and standards between male and female participants is minimal, indicating no significant gender-based difference in adherence to ethical principles.

Conclusion: The findings of this research indicate that, in the 192 studies analyzed, researchers did not specifically focus on ethical principles and standards tailored to children and young people. Instead, their studies primarily adhered to general scientific research ethics.

Keywords: Meta analysis, child and youth, research, ethic.

Çocuk ve Gençlik Temalı Sosyal Hizmet Akademik Yayınlarının Etik Değerlendirilmesi: Meta Analiz

Öz

Amaç: Bu araştırma çocuk ve gençlik temalı sosyal hizmet akademik yayınlarının etik ilke ve standartlara uygunluğunun incelenmesini ve değerlendirilmesini amaçlamıştır.

Yöntem: Araştırmanın amacı doğrultusunda meta analiz yöntemi tercih edilmiş ve örneklem olarak makale ve tezlerden oluşan 737 adet çalışma içerisinden dahil edilme kriterlerine uyum sağlayan 192 adet çalışma belirlenmiştir. Belirlenen kodlama yöntemi ile çalışmalar biçim ve içerik özelliklerine göre incelenmiş, etik ilke ve standartlara uygunlukları değerlendirilmiş ve etki büyüklükleri hesaplanmıştır. Bu hesaplama sürecinde grup farklılığı meta analiz yöntemi kullanılmış ve bu modelde standartlaştırılmış etki büyüklüğünü ortaya koyabilmek adına kadın-erkek gibi doğal gruplar oluşturulmuştur. Ayrıca etki büyüklüğünün hesaplanması için Hedges's g değeri benimsenmiş ve rastgele etki modeli tercih edilmiştir.

Bulgular: Araştırmada her bir örneklem grubundaki etki büyüklüğüne bakıldığında Hedges's g değerinin küçük düzeyde olduğu bulgusu elde edilmiştir. Bu bulgu ise çalışmalarda yer alan kız ve erkek katılımcılar

arasında etik ilke ve standartlar bağımlı değişkeni bağlamında farkın boyutunun oldukça küçük olduğunu ve cinsiyetler arasında anlamlı bir farklılık olmadığını göstermiştir.

Sonuç: Araştırma sonucunda toplam 192 adet çalışmada yer alan araştırmacıların çocuk ve gençlere özgü etik ilke ve standartlar bağlamında çalışmadıkları genel olarak bilimsel araştırma etiğine özgü çalışmalar yaptıkları görülmüştür.

Anahtar Sözcükler: Meta analiz, çocuk ve genç, araştırma, etik.

Introduction

Social work is an applied discipline aimed at ensuring that individuals at the micro, mezzo, and macro levels of society attain minimum living standards and enhanced social functionality[1]. Professionals who utilize their knowledge, skills, and values to make professional interventions toward this goal are defined as social workers. Social workers must adhere to ethical principles while performing professional interventions in roles such as case managers, advocates, facilitators, planners, policy developers, and educators[2]. This raises the issue of ethical principles and standards that underpin social work ethics. In broad terms, social work ethics comprise moral guidelines that direct social workers to act in accordance with the profession's established ethical principles and standards[3-5]. By adhering to these ethical standards, professionals can navigate challenges in practice and adopt a value-based approach, ensuring human-centered service delivery in the face of ethical dilemmas. However, ethical considerations in social work are not confined to practice alone; they are equally critical in professional research. Social work research, which aims to solve problems, remains client-oriented, and generates practice-oriented knowledge, serves to address the challenges faced by individuals, families, groups, and communities. It also contributes to the advancement of professional practice by employing systematic research methods[6-8]. These studies emphasize the socio-cultural contexts of individuals, rely on theoretical foundations, and facilitate significant changes throughout the intervention process. They also highlight the participation of disadvantaged groups who lack minimum living conditions[7]. Given the involvement of disadvantaged groups, ethical principles and standards become even more crucial in social work research[9]. A review of the literature identifies various disadvantaged groups, with children and young people receiving particular attention due to their vulnerability[10,11]. Because of their developmental characteristics, children and young people are among the most at-risk populations, facing challenges such as neglect, abuse, and deprivation of basic needs. Consequently, as in many other disciplines, social work also prioritizes addressing the fundamental issues affecting children and young people[12-16]. In all these studies, researchers must remain cognizant of potential harm and implement measures to mitigate risks. Therefore, adherence to ethical principles and standards is imperative for all researchers working with children and young people. This raises the question of whether a universally accepted ethical framework exists for studies involving these populations. A review of the literature suggests that while general scientific ethical guidelines are commonly referenced in research involving children and young people, studies explicitly focusing on ethical principles and standards for these populations remain limited. Among the key references in this area are the guidelines published by the Society for Research in Child Development (SRCD) and the "Ethical Research Involving Children (ERIC)" principles, developed by the International

Children's Center in collaboration with the Delegation of the European Union to Türkiye. Additionally, several other studies discuss the ethical principles, standards, and general rules that should be observed in research involving children and young people[17-20].

In conclusion, this study aims to assess the extent to which academic research focusing on children and young people adheres to ethical principles and standards. To achieve this objective, relevant academic studies in the field will first be identified, followed by a meta-analytic evaluation. The research will also provide insights into the degree of adherence to ethical principles and standards in studies involving children and young people. Specifically, it will examine whether ethical principles evolve in response to changing conditions and whether a universal set of ethical standards can be established for research involving children and young people. This is particularly important given the dynamic nature of social work ethics, which continues to evolve in parallel with professional practices. The study seeks to answer the following questions: To what extent do social work research studies adhere to ethical principles and standards related to children and young people? How are these ethical principles and standards distributed in terms of gender differences? And do these principles evolve in response to changing conditions?

The study is significant as it represents the first comprehensive meta-analysis in Türkiye focusing on ethical evaluations related to children and youth in the field of social work. It underscores the importance of considering not only scientific research ethics but also specific ethical principles and standards relevant to children and young people in social work research. This approach will enable social work professionals to conduct their practices more effectively within an ethical framework. Furthermore, the study's use of appropriate statistical methods, such as the random effects model, accounting for the heterogeneous data structure, enhances the reliability and accuracy of the results.

Material and Methods

Study Design and Participants

This study employed a meta-analysis design. First introduced by Glass in 1976, meta-analysis is defined as a statistical technique used to integrate and synthesize findings from individual studies[21].

The research sample includes theses and articles from academic social work studies involving children and young people as participants. The inclusion criteria for the study have been established within the methodology, while studies falling outside these criteria have been designated as exclusion criteria.

Inclusion Criteria:

- Studies must have been published between 2015 and 2020 to ensure relevance and timeliness.
- Studies must be indexed in the specified databases or search engines.
- Studies must employ a quantitative research design to allow for the calculation of effect size.
- The study sample must include children and young people as participants.
- Studies must be published in academic social work journals.

- Studies must be published in Turkish and conducted within Türkiye.
- Full-text access to the theses must be available.

Coding

During the coding phase, a critical stage of the meta-analysis method, three primary coding methods were employed. First, the "descriptive data of the study" coding was performed, which involved examining details such as publication years, source types, databases, publishing institutions, publication types, and authors. The second stage, "content of the study" coding, focused on ethical considerations, including informed consent forms, ethics committee approvals, multiple rights considerations, and ethical dilemmas. Finally, the "study data" coding was performed to analyze statistical information such as means, standard deviations, and effect sizes.

Data Collection

As part of the research, various sources and databases were utilized for data collection. These included the National Thesis Center of the Higher Education Council (YÖKTEZ), ULAKBİM, Google Scholar, YÖK Academy, and DergiPark. Additionally, key search terms such as "child", "youth", "young", "vulnerable groups", "social work", "disadvantage", "adolescence", "adolescent", and "social service" were used to retrieve relevant studies. When selecting these key terms, care was taken to ensure they reflect the distinct characteristics of the target population and the research field, while also aligning with the existing literature in social work. The search process was conducted between March 2, 2021, and March 12, 2021.

The first step of the search process involved searching for articles, yielding a total of 563 studies. Of these, 418 studies were excluded for not meeting the inclusion criteria. Reasons for exclusion included qualitative research design (210 studies), involvement of participants other than children and youth (64 studies), and the absence of statistical data needed to calculate effect size (144 studies). As a result, 145 article studies were included in the meta-analysis. When examining the participant groups of these studies, 39 studies involved child participants (concepts of children and adolescents), 101 studies involved young participants (concepts of youth), and 5 studies involved both child and young participants.

The second step of the search process involved identifying relevant theses, yielding a total of 174 studies. Of these, 127 studies were excluded for not meeting the inclusion criteria. Reasons for exclusion included 72 studies with a qualitative research design, 2 studies conducted in a different language, 20 studies involving participants other than children and youth, and 33 studies lacking the necessary statistical data. Consequently, 47 theses were included in the meta-analysis. In terms of participant groups, 31 studies focused on children, 14 studies examined young participants, and 2 studies included both children and young participants.

In conclusion, the meta-analysis was conducted with a total of 192 studies.

Analyzing Data

At this stage, all data were first analyzed using two scales based on their form and content characteristics, following the coding method. In addition to these characteristics, the following aspects were also considered:

- Consideration of children's rights.
- Approval from an ethics committee.
- Inclusion of consent forms.
- The potential benefits of the study for the child.
- Assessment of any coercion involved.
- Identification of ethical dilemmas.
- Types of children included in the studies.
- Use of appropriate language.
- Alignment of research questions with developmental stages.
- Researcher's competence.

In addition to these coding methods, the studies were also analyzed based on their data. In this context, the "Group Difference Meta-analysis" model was employed for the meta-analysis. This model requires naturally occurring groups, such as male and female, to calculate the standardized effect size. Accordingly, the data were divided into two separate groups-male and female-with gender considered as the independent variable. The "Hedges's g" value was used to determine the effect size. To interpret the effect sizes, Cohen's (1998) standardized effect size classification was applied, where 0.2 represents a small effect, 0.5 a medium effect, and 0.8 a large effect. Additionally, the "Random Effects Model" was employed as the effect model. This model was selected based on a review of the relevant literature, which indicated that many studies in the social sciences align with this approach. Another reason for selecting this model was the high level of heterogeneity among the included studies. Additionally, Microsoft Office Excel 2021 was used for analyzing the descriptive data, while the Comprehensive Meta-Analysis (CMA) software was employed to calculate the overall effect size.

Result

Descriptive Data of the Study

A total of 192 studies were analyzed within the scope of this research. Of these, 70 focused on children, 115 on youth, and 7 on other participants. The findings from these studies were subjected to formal analyses, which are presented below.

Table 1. Trends in study distribution over time: increase and decrease patterns by year

Years of Work	Frequencies	Percent (%)
2015	11	5.73
2016	20	10.42
2017	12	6.25
2018	39	20.31
2019	62	32.29
2020	48	25.00

An analysis of the distribution of studies by year reveals a notable upward trend in publications starting from 2018, with the highest number of studies recorded in 2019, marking it as the most significant contributing year to the research. A slight decline in publications is observed in 2020, potentially due to the impact of external factors such as the COVID-19 pandemic (Table 1).

Table 2. Distribution of studies by publication type: articles, master's theses, and doctoral theses

Publication Type	Frequencies	Percent (%)
Master Thesis	44	22.92
PhD Thesis	3	1.56
National and International Articles	145	75.52

An analysis of the studies included in the meta-analysis by publication type reveals that the majority of the studies, 145 (75.52%), were published as national and international articles. This was followed by 44 master's theses (22.92%) and 3 doctoral theses (1.56%) (Table 2). This distribution highlights the prominence of article-based studies in the literature, with a comparatively smaller representation of theses.

Data on the Contents of Studies

Within the scope of this research, the included studies were first examined to determine whether they addressed children's rights. Specifically, the analysis considered the four guiding principles of the United Nations General Assembly's Convention on the Rights of the Child, adopted on November 20, 1989: non-discrimination, the best interests of the child, the right to life, survival, and development, and the right to participation. The findings revealed that, out of the 192 studies included in the research, only 14 explicitly addressed children's rights.

In addition to children's rights, the presence of informed consent forms from participants and their guardians was also examined. The findings indicated that, among the 192 studies included in the research, 45 studies incorporated informed consent forms (19 written, 20 verbal, and 6 both written and verbal). For the remaining studies, it was unclear whether informed consent was obtained, particularly in many article-based studies where researchers did not specify this aspect. Regarding parental consent, since most participants were under the age of 18 and classified as "child participants",

obtaining parental consent was deemed necessary. Accordingly, out of the 192 studies, only 14 reported obtaining parental consent, with 13 using written consent and 1 using verbal consent.

In addition to the previously mentioned data regarding the content of the included studies, it was found that 62 out of the 192 studies had obtained ethical approval. These studies ensured that participants were not exposed to any risks, emphasized voluntariness, and did not encounter ethical dilemmas. Furthermore, while some studies employed scales appropriate for the developmental stages of participants, 16 studies were deemed inappropriate in this regard. Confidentiality was prioritized, and researchers conducted studies within their areas of competence. Additionally, 78 studies had obtained the necessary legal permissions, and no bias or conflict of interest was identified.

Findings on the Overall Impact

Within the scope of this research, a comparison group was required to calculate the effect sizes of the studies. Accordingly, gender was selected as the independent variable, while ethical principles and standards were designated as the dependent variables. The magnitude of the difference between male and female participants was then analyzed based on the effect size. At this stage, all studies were categorized into those involving child, young, and other participants.

Based on the effect size and heterogeneity test results presented in Table 3, an analysis of 70 studies involving child participants revealed an effect size of Hedges's g = 0.257 in the random effects model, indicating a small effect size. Additionally, the I^2 value was calculated as 96.382, suggesting a high level of heterogeneity among the studies. These findings suggest that the difference between gender (independent variable) and ethical principles and standards (dependent variable) among child participants is minimal. In other words, no significant difference was observed between genders in terms of ethical principles and standards, highlighting the importance of adhering to ethical principles consistently, regardless of gender differences. The high heterogeneity observed in the studies points to potential methodological variations across the studies. Despite this variability, the small effect size emphasizes the need for uniform adherence to ethical standards across all studies, independent of gender.

Table 3. Effect sizes and heterogeneity test results for studies involving child participants

Model	Number of Studies	Effect Size	Standard Error	Z-value	p	%95 Confidence Interval		Heterogeneity Test			
						Lower Limit	Upper Limit	Freedomd (Q)	Q-value	p	I^2
Fixed Effect Model	70	0.088	0.012	7.079	0.000	0.064	0.112	69	1906.93	0.000	96.382
Random Effect Model	70	0.257	0.067	3.835	0.000	0.126	0.228				

According to the Forest Plot graph illustrating the distribution of studies based on the random effects model, the effect sizes of the studies appear to be relatively similar.

However, some studies exhibit higher effect sizes, while others demonstrate lower effect sizes, indicating variability in impact levels[22-26].

An analysis of the 115 studies involving young participants revealed an average effect size of Hedges's g = 0.189 in the random effects model, indicating a small effect size. Additionally, the I² value was calculated as 96.861, indicating a high level of heterogeneity among the studies (Table 4). Based on Cohen's (1988) standardized mean difference classification, the effect size was categorized as small. These findings suggest that similar to studies involving children, the difference between gender (independent variable) and ethical principles and standards (dependent variable) among young participants is minimal. This underscores the importance of consistently adhering to ethical principles and standards, regardless of gender.

Table 4. Effect sizes and heterogeneity test results for studies involving young participants

Model	Number of Studies	Effect Size	Standard Error	Z-value	p	%95 Confidence Interval		Heterogeneity Test			
						Lower Limit	Upper Limit	Freedom d (Q)	Q-value	p	I²
Fixed Effect Model	115	0.152	0.010	15.855	0.000	0.113	0.170	114	3631.397	0.000	96.861
Random Effect Model	115	0.189	0.055	3.463	0.000	0.082	0.296				

According to the Forest Plot Graph, which reveals the distribution of the studies included in the study according to the random effect model, all studies have a close level of impact. However, there are also studies with more effect[14,27,28] or less effect than others[29].

An analysis of the seven studies involving participants categorized as "other" revealed an average effect size of Hedges's g = 0.214 in the random effects model, suggesting a small effect size. Additionally, the I² value was calculated as 88.188, indicating a considerable level of heterogeneity among the studies (Table 5). Based on Cohen's (1988) standardized effect size classification, the observed effect size is small. These findings suggest that the difference between gender (independent variable) and ethical principles and standards (dependent variable) in studies involving "other" participants is minimal. This indicates that ethical principles and standards do not significantly vary based on gender within this participant group, underscoring the importance of maintaining universal ethical guidelines across all research.

Table 5. Effect sizes and heterogeneity test results for studies involving other participants

Model	Number of Studies	Effect Size	Standard Error	Z-value	p	%95 Confidence Interval		Heterogeneity Test			
						Lower Limit	Upper Limit	Freedom d (Q)	Q-value	p	I²
Fixed Effect Model	7	0.256	0.040	6.419	0.000	0.178	0,335	6	5.,492	0.000	88.188
Random Effect Model	7	0.214	0.126	1.695	0.000	-0.034	0.462				

According to the Forest Plot Graph, which reveals the distribution of the studies included in the study according to the random effect model, all studies have an effect close to each other. However, there are also studies with the highest[30] and the lowest effect[31].

In conclusion, the magnitude of the difference between male and female participants regarding ethical principles and standards, as the dependent variable, was assessed based on effect sizes across the analyzed studies. This evaluation, conducted across both thesis and article studies, revealed that in research involving child and youth participants, the difference in ethical principles and standards between genders was consistently minimal across all analyses.

Discussion

This study aimed to assess the adherence to ethical principles and standards in academic publications on child and youth-focused social work. A meta-analysis was conducted on a total of 192 studies, representing 26.05% of all collected studies. The number of studies included in the meta-analysis varied depending on the research focus and objectives. Notably, no prior meta-analytical studies on this topic have been identified in the national social work literature. The majority of the analyzed studies originated from the field of psychology, with a smaller proportion from sociology within the broader domain of social sciences. In contrast, the international literature includes several meta-analyses on similar topics; however, the number of studies incorporated in these analyses varies significantly. For instance, while some meta-analyses include as many as 88 studies, others incorporate as few as 15[32-37].

The meta-analyzed studies were examined for their distribution across years, revealing an uneven pattern with fluctuations over time. The lowest number of studies was recorded in 2015, whereas the highest number was observed in 2019. However, despite this peak, a decline in the number of studies was noted from 2019 to 2020, largely attributed to the impact of the COVID-19 pandemic.

The pandemic significantly constrained research activities by limiting access to research environments, particularly affecting studies involving children and youth. The transition of schools (elementary, middle, high schools, and universities) to online education hindered access to sample groups, which are essential for such research. Additionally, delays in obtaining necessary legal permissions further impeded the feasibility of conducting these studies. Beyond its impact on physical and legal conditions, the COVID-19 pandemic also had profound effects on the motivation levels of researchers. During this period, academics experienced heightened feelings of alienation from their profession across various dimensions. Consequently, many reported a significant sense of vulnerability and isolation in multiple aspects of their professional lives[38].

Another key finding of this research concerns the publication types of the studies. The analysis revealed that most studies included in the meta-analysis were published as articles. However, in contrast to this finding, some meta-analyses conducted by other researchers have reported a higher prevalence of doctoral studies, while others have found master's theses to be more common[39-41]. However, some studies aligned with the findings obtained in this research[42-44].

Within the scope of this research, a total of 192 studies were analyzed based on effect sizes. Specifically, 70 studies involving child participants, 115 studies involving young participants, and 7 studies involving other participants were examined separately using the Comprehensive Meta-Analysis (CMA) software. Prior to the analysis phase, the "Group Differences Meta-Analysis" model was employed to define natural groups, such as male and female, to facilitate the calculation of standardized effect sizes. For effect size estimation, "Hedges' g" was utilized, and the "Random Effects Model" was chosen to account for variability across studies. Accordingly, the effect sizes calculated for the studies were as follows: Hedges' g=0.257 for the 70 studies involving child participants, Hedges' g=0.189 for the 115 studies involving young participants, and Hedges' g=0.214 for the 7 studies involving other participants. According to Cohen's (1988) standardized mean difference criteria, these values indicate a small effect size. The findings suggest that in studies involving children, young people, and other participants, the differences in ethical principles and standards between male and female participants are minimal. These findings suggest that in studies involving children and young people, there is no significant difference between genders regarding ethical principles and standards, underscoring the need for uniform ethical considerations. A review of the relevant literature indicates that no previous studies have specifically examined this aspect within the field of social work, making direct comparisons challenging. However, individual studies in both social work research and research involving children and young people highlight the significance of adhering to ethical principles and standards. In studies focusing on social work research, certain scholars are particularly emphasized, with their work underscoring the importance of conducting both quantitative and qualitative research through evidence-based practices to ensure ethical integrity and effective problem-solving in social work interventions[6,7,45-51]. The second point is that several studies, along with notable researchers, emphasize the ethical principles and standards that should be upheld in research involving children and young people[18,19,47]. Across these studies, it is notable that the focus is exclusively on children, without distinguishing young participants, in contrast to the present research. According to legal definitions, all individuals under the age of 18 are classified as children. Furthermore, within the scope of this research, no studies have been identified that assert significant differences in ethical principles and standards between genders in research involving children and young people. This finding aligns with the results obtained in the present study.

Conclusion

In conclusion, this study conducted a meta-analysis of ethical evaluations in academic publications on social work with a focus on children and youth. Quantitative studies related to the topic were systematically reviewed, and the findings were presented. A total of 192 studies were analyzed, the majority of which were journal articles. Among these, 70 studies involved children, 115 involved young people, and 7 involved other participants. The highest number of publications was recorded in 2019, with university students being the most frequently studied sample group. Due to the heterogeneity in data distribution, the random effects model was employed. Across all groups, a small effect size was observed. Furthermore, it was noted that researchers generally prioritized

scientific research ethics over ethical principles and standards specifically tailored to children and young people.

Recommendations:

- Future research in social work, especially involving children and young people, should place greater emphasis on the application of specific ethical principles tailored to these populations. Researchers are encouraged to explore ethical standards that account for the unique vulnerabilities of children and young people, beyond general scientific research ethics.

- A universally accepted set of ethical guidelines for research involving children and youth should be established. This would ensure consistency in ethical decision-making and promote the protection of rights for these vulnerable populations across various social work settings and research methodologies.

- Although this study found minimal differences in ethical principles between male and female participants, further research is needed to explore gender-specific ethical considerations. Future studies should investigate whether ethical standards should be adjusted based on gender differences or other demographic factors to ensure that all participants are treated fairly and equitably.

- Social work researchers should receive more comprehensive training on ethical principles, particularly those that apply to vulnerable populations.

Limitations

This study has several limitations. Firstly, only studies published in Turkish and conducted within Türkiye were included, which limits the findings to the national literature. Additionally, only quantitative research was considered, excluding qualitative studies that could have provided deeper insights into ethical principles. High heterogeneity was observed among the studies, which may impact the reliability of the analysis due to methodological differences. External factors, such as the pandemic, hindered the data collection process and the feasibility of conducting research, leading to a decrease in the number of publications in 2020. Finally, the analysis was based solely on numerical data from the studies, which resulted in a lack of content depth. Future research could address these limitations by incorporating a broader sample and methodological diversity.

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Investigation of the Relationship of CRP/Albumin Ratio with Clinical Parameters, Prognosis and Physiotherapy in Amyotrophic Lateral Sclerosis CRP/Albumin Ratio in Amyotrophic Lateral Sclerosis

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Abstract

Aim: The aim of this study was to investigate relationship of baseline CRP/albumin ratio (CAR) value with clinical parameters, post treatment functional capacity and physiotherapy effectiveness in patients with Amyotrophic Lateral Sclerosis (ALS).

Method: Ethical approval was obtained for this study on June 16, 2023, with number E. Kurul-2023-21/751. This retrospective study was undertaken between January 2021 and January 2024. Forty-five patients were included in the study based on their blood test results, ALSFRS-R scores, and disease-related clinical findings accessed through electronic patient records. Forty-five healthy people of similar age and gender who attended check-up clinic without any complaints were included in study as a control group.

Results: A total of 90 people, 45 patients with ALS and 45 healthy people as control group were included in study. The female/male ratio and mean age of both groups were similar and there was no statistical difference. The mean CAR of patients with ALS was 1.92±0.14, while mean CAR of control group 0.82±0,15 and there was no significant difference in mean CAR between the groups (p: 0.2). White Blood Cell (WBC) and Neutrophil were significantly higher in ALS group according to control group (p:0.017, p:0.038). CAR was not found to correlate with clinical parameters of ALS and number of physiotherapy sessions received. Functional ambulation Scale scores were found to be higher as number of physical therapy sessions increased.

Conclusion: This study is first to evaluate CAR in patients with ALS. CAR measured at time of diagnosis of ALS disease was not significantly higher than control group, and we could not find a relationship between CAR and post treatment functional scores. However, CAR may be an important parameter, especially in evaluating malnutrition and chronic inflammation when disease progresses and complications develop.

Keywords: Amyotrophic Lateral Sclerosis, CRP/Albumin ratio, Amyotrophic Lateral Sclerosis Functional Rating Scale, physiotherapy effectiveness.

Amyotrofik Lateral Sklerozda CRP/Albumin Oranının Klinik Parametreler, Prognoz ve Fizyoterapi ile İlişkisinin Araştırılması: Amyotrofik Lateral Sklerozda CRP/Albumin Oranı

Öz

Amaç: Bu çalışmanın amacı, Amyotrofik Lateral Sklerozlu (ALS) hastalarda başlangıç CRP/albümin oranı (CAR) değerinin klinik parametreler, tedavi sonrası fonksiyonel kapasite ve fizyoterapi etkinliği ile ilişkisini araştırmaktır.

Yöntem: Bu çalışma için 16 Haziran 2023 tarihinde E. Kurul-2023-21/751 numarasıyla etik onay alındı. Bu retrospektif çalışma Ocak 2021 ile Ocak 2024 tarihleri arasında gerçekleştirildi. ALS tanısı almış 57 hasta

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arasından kan testi sonuçları, Revize Amyotrofik Lateral Skleroz Fonksiyonel Değerlendirme Ölçeği (ALSFRS-R) skor kayıtları ve hastalıkla ilişkili klinik bulguları elektronik hasta raporu aracılığıyla erişilen 45 hasta çalışmaya dahil edildi. Herhangi bir şikayeti olmadan Check-up polikliniğine başvuran benzer yaş ve cinsiyetteki 45 sağlıklı kişi kontrol grubu olarak çalışmaya dahil edildi.

Bulgular: Çalışmaya 45 ALS tanılı hasta ve 45 sağlıklı kişi kontrol grubu olmak üzere toplam 90 kişi dahil edildi. Her iki grubun kadın/erkek oranı ve yaş ortalamaları benzerdi ve istatistiksel olarak fark yoktu. ALS'li hastaların ortalama CAR'ı 1,92±0,14 iken, kontrol grubunun ortalama CAR'ı 0,82±0,15 idi ve ortalama CAR açısından gruplar arasında anlamlı bir fark yoktu (p: 0,2). Beyaz Küre Hücresi (WBC) ve Nötrofil, ALS grubunda kontrol grubuna göre anlamlı olarak daha yüksekti (p:0,017, p:0,038). CAR'ın ALS'nin klinik parametreleri ve alınan fizyoterapi seansı sayısı ile ilişkili olmadığı bulundu. Fonksiyonel ambulasyon Ölçeği puanlarının, fizyoterapi seansı sayısı arttıkça daha yüksek olduğu bulundu.

Sonuç: Bu çalışma, ALS'li hastalarda CAR'ı değerlendirmek için ilk çalışmadır. ALS hastalığının tanısı sırasında ölçülen CAR, kontrol grubundan anlamlı olarak daha yüksek değildi ve CAR ile tedavi sonrası fonksiyonel puanlar arasında bir ilişki bulamadık. Ancak, CAR, özellikle hastalık ilerlediğinde ve komplikasyonlar geliştiğinde yetersiz beslenmeyi ve kronik inflamasyonu değerlendirmede önemli bir parametre olabilir.

Anahtar Sözcükler: Amyotrofik Lateral Skleroz, CRP/Albümin oranı, Amyotrofik Lateral Skleroz Fonksiyonel Derecelendirme Ölçeği, fizyoterapi etkinliği.

Introduction

Amyotrophic Lateral Sclerosis (ALS), one of the rare neurological diseases in the world, is a progressive neurodegenerative disease that affects the upper motor and lower motor neurons in the brain and spinal cord, causing loss of muscle control[1]. The incidence of ALS is estimated to be 2-3 per 100,000 people in European countries and 0.7-0.8 per 100,000 people in Asian countries[2]. ALS is a disease that begins in adulthood, is usually seen between the ages of 51-66, and is more common in men[3]. Although many theories have been proposed for the etiology of ALS, including oxidative stress, mitochondrial dysfunction (loss of function), protein aggregation, autophagy, and glutamate excitotoxicity, the underlying mechanisms have still not been elucidated[4]. While 90-95% of ALS cases are sporadic, 5-10% are seen in the familial form of ALS[5]. ALS classification based on clinical type is divided into two groups: extremity-onset and bulbar-onset. While weakness in the fingers, difficulty in writing and holding objects, weakness in the lower extremities, balance problems, and difficulty in walking are observed in limb-onset ALS; speech and swallowing difficulties are observed in bulbar-onset ALS. Bulbar-onset ALS is rare and the survival time of patients with bulbar onset is shorter than patients with extremity onset[6].

The diagnosis of ALS disease is primarily based on symptoms and neurological examination findings. EMG/electrophysiology has a privileged place as the basic examination method in diagnosis[7]. Upper motor neuron involvement must also be demonstrated clinically in order to diagnose ALS, in addition to detecting widespread lower motor neuron degeneration by clinical and/or electrophysiological methods[8]. ALS is a progressive and fatal disease, and there is no full treatment available today. Medical treatment can only slow down the progression of the disease in the treatment of ALS, and so symptomatic treatment becomes important. The main goal of treatment is to increase survival, quality of life, and physical functionality[9]. Studies suggest stretching for shortened muscles, strengthening exercises to maintain joint movement, and balance

exercises to prevent the risk of falling, although there is no specific rehabilitation protocol in the treatment of ALS[10,11]. The patient's functional status is one of the most important indicators of quality of life and survival, and revealing the patient's functional status with scoring systems such as The Revised Amyotrophic Lateral Sclerosis Functional Rating Scale (ALSFRS-R) and Functional Ambulation Scale (FAS**)** is important for prognosis[12].

C-reactive protein (CRP) is a positive acute-phase protein synthesized by the liver and adipose tissue, and it is one of the most widely used biomarkers to indicate systemic inflammation[13,14]. While CRP increases as a positive acute-phase reactant in the presence of inflammation, albumin decreases as a negative acute-phase reactant. CRP/albumin ratio (CAR) effectively indicates both malnutrition and inflammation and is a useful biochemical parameter in predicting prognosis in seriously ill patients[15,16]. CAR has been used, especially in recent years, to predict the prognosis of progressive neurodegenerative diseases[17-19].

Malnutrition is often associated with decreased muscle mass, deterioration in muscle functions, anemia, hypoalbuminemia, immune dysfunction, decreased cognitive functions, increased risk of falling, the need for mechanical ventilation, prolonged hospitalization, and mortality[20]. Malnutrition is common in ALS due to decreased swallowing and nutritional functions and prolonged stays in hospitals and intensive care units due to complications. Albumin, an objective indicator of malnutrition, was found to be low in patients with ALS in previous studies and was considered a poor prognosis indicator[13,21-24]. CRP, an objective indicator of inflammation, has been found to be high in ALS patients in previous studies and has been shown to be associated with poor prognosis[24-26].

There is no study in the literature examining the relationship between CRP, CAR or inflammatory parameters and physiotherapy in ALS. The literature mostly evaluates the effect of physiotherapy on ALS. Forty-eight patients with ALS were given controlled and moderate-intensity aerobic exercise in addition to standard treatment, ROM and strengthening exercises; no difference was found between the groups[10]. 18 patients with ALS were given moderate-intensity graded aerobic exercise; there was no significant change in ALSFRS-R scores in the treatment group compared to the control group[27].

Although CRP and albumin are frequently studied in patients with ALS, CAR has not been studied in patients with ALS in the literature, and the relationship of inflammatory parameters with physiotherapy in patients with ALS has not been evaluated. In this study, we aimed to investigate the relationship of initial CAR value with clinical parameters and physiotherapy in patients with ALS.

Material and Methods

Study Design

This retrospective study was undertaken between January 2021 and January 2024. Acibadem Mehmet Ali Aydinlar University Medical Research Evaluation Committee approval was obtained before starting the study on 11.01.2024 (approval no: 2023-21/751). Provincial Health Directorate's Scientific Research Commission and adhered to the principles of the Helsinki Declaration.

Patients

It was planned to screen all patients diagnosed with ALS in the records, including all records examined in our hospital in the last 3 years since ALS is a very rare disease, although a G-power power analysis application was used to calculate the sample size. Before starting work, Power analysis was done with G-power version 3.1.9.4 and it was calculated that a total of 52 patients would need to be included in the study for an effect size of 0.518, a margin of error of 0.05 and a power of 95% according to the CAR parameter[17]. Patients diagnosed with ALS at Neurology, and the Physical Medicine and Rehabilitation outpatient clinic between January 2021 and January 2024 were scanned. Considering the patients' comorbidities, patients with conditions that could affect CAD at the time of initial diagnosis (e.g., history of infectious disease in the last month, active infection and antibiotic-antiviral use, rheumatological disease diagnoses) were not included in the study. Forty-five patients were included in the study based on their blood test results, ALSFRS-R scores, and disease-related clinical findings accessed through electronic patient records. Forty-five healthy people of similar age and gender who attended the check-up clinic without any complaints were included in the study as a control group.

Demographic information such as age and gender of the patient and control groups at the time of initial diagnosis; clinical information the patient group; such as ALS initial symptom of age of ALS onset, disease duration, family history, comorbidities, FAS scores, ALSFRS-R scores, whether or not they received physiotherapy, physiotherapy sessions applied, and mortality rates were recorded. Patient and control groups' biochemical parameters such as creatinine, albumin, CRP, Erythrocyte Sedimentation Rate (ESR), White Blood Cell (WBC), hemoglobin (HGB), platelet (PLT), neutrophil (NEU), lymphocyte (LYMP), monocyte (MONO), and CAR levels; were recorded at the time of first admission to the hospital.

The physiotherapy program was applied 3 days a week, for an average of 45 minutes, for 8-10 weeks, in the form of joint range of motion, strengthening and stretching exercises, balance and walking training.

Outcome Measures

Functional Ambulation Scale (FAS): was used to determine the ambulation levels of the patients. Ambulation level was evaluated in 6 categories, including FAS 0-5 before and after treatment. As scores increase in FAS, ambulation improves; while the patient cannot ambulate in stage 0, he can ambulate independently in stage 5[28]. The evaluation of the FAS was obtained retrospectively from the patient's electronic patient card, using patient evaluation data from the last Neurology, and the Physical Medicine and Rehabilitation outpatient clinic follow-up.

The Revised Amyotrophic Lateral Sclerosis Functional Rating Scale (ALSFRS-R) is a scale consisting of 12 parameters such as speech, salivation, swallowing, handwriting, feeding, dressing and self-care, turning and covering in bed, walking, climbing stairs, dyspnea, orthopnea and respiratory failure and it is evaluated with a total of 48 points. Each question is evaluated between 0 and 4 points. The functionally normal patient is evaluated with four points. Zero points are given to the

worst functional state while scores decrease from four to below due to functional deterioration Turkish validity and reliability study was conducted by Koç et al in 2016[29]. The evaluation of the ALSFRS-R was obtained retrospectively from the patient's electronic patient card, using patient evaluation data from the last Neurology, and the Physical Medicine and Rehabilitation outpatient clinic follow-up.

Statistical Analysis

All analyses were carried out with SPSS 26.0 (IBM, USA). The findings of the study are expressed as frequency and percentages. Normality analysis was carried out using the Kolmogorov-Smirnov test. The variables that were not normally distributed are presented as the median and interquartile range (IQR) with 25–75 percentiles. Descriptive statistics mean and standard deviation (mean (SD)) were used for normally distributed variables; mean and minimum-maximum values were used for non-normally distributed variables. Categorical variables were compared using the Chi-Square test. Continuous repeated measurements were compared using the paired samples t-test and the Wilcoxon signed-ranks test. Fischer exact, Pearson Chi-Square, and Yate's continuity correction test were applied. Pearson correlation analysis between CAR, ALSFRS-R, FAS and clinical factors was done. Finally, a ROC curve analysis to find cut-off values for CAR was applied.

Results

A total of 90 people, 45 patients with ALS and 45 healthy people as the control group were included in the study. Clinical findings of patients with ALS are listed in Table 1.

Table 1. Clinical characteristics of the patients with ALS

		n(%)
ALS onset symptom	Walking disorder	29(64.4)
	Speech disorder	7(15.6)
	Loss of fine motor skills in hands	5(11.1)
	Fasciculations	4(8.9)
ALS onset age (Mean±SD)	50.36±8.54	
ALS duration (Mean Years)	4.89	
Family history	Yes	3(6.7)
	No	42(93.3)
Comorbidity	No	12(26.7)
	Hypertension	15(33.3)
	Coronary artery disease	10(22.2)
	Diabetes Mellitus	5(11.1)
	Hypothyroidism	2(4.4)
	Hypertension+Diabetes Mellitus	1(2.2)
Physiotherapy treatment	Yes	16(35.6)
	No	29(64.4)
Number of Physiotherapy Sessions Received (Mean)	24	
	FAS score 0	24(53.3)

FAS score	FAS score 1	5(11.1)
	FAS score 2	1(2.2)
	FAS score 3	6(13.3)
	FAS score 4	9(20)
ALSFRS-R score (Mean)	13.22	
Death	Yes	15(33.3)
	No	30(66.7)

ALS: Amyotrophic Lateral Sclerosis, N: Number, SD: Standard deviation, FAS: Functional ambulation scale, ALSFRS: Amyotrophic Lateral Sclerosis Functional Rating Scale

Ten (22.2%) of the patients with ALS were female; 12 (22.2%) of the control group were female and the gender ratio was the same between groups. There was no significant difference in mean age between the groups (p: 0.97). Albumin and CAR values showed normal distribution based on Skewness and Kurtosis tests[30,31]. The mean CAR of patients with ALS was 1.92±0.14, while the mean CAR of control group 0.82±0,15 and there was no significant difference in mean CAR between the groups (p: 0.2). There was a statistical difference between the ALS and control groups only in the number of WBC and NEU; WBC and NEU were significantly higher in the ALS group compared to the control group (p:0.01, p:0.03) (Table 2).

Table 2. Laboratory test results of the patients and the control group

		ALS (N:45)	**Control (N:45)**	**Reference Values**	**p**	Skewness Curtosis
Gender (n/%)	Female	10(22.2)	10(22.2)		1	
	Male	35(77.8)	10(22.2)			
Age (Mean±SD)		55.24±5.67	55.29±5.61		0.97	1.78 3.90
Cretatinine mg/dL (Mean)		0.56	0.58	0.70-1.20 mg/dL	0.72	0.86 3.58
ALB g/dL (Mean± SD)		3.86± 0.65	4.03± 0.45	3.50-5.20 g/dL	0.13	-0.80 1.42
CRP mg/dL (Mean)		5.63	2.75	<5 mg/dL	0.17	0.89 0.13
ESR mm/H (Mean)		27.56	26.36	<20 mm/H	0.86	0.69 1.53
WBC x10^3/uL (Mean)		10.22	8	4.10-10.60 x10^3/uL	**0.01**	2.70 10.55
HGB g/dL (Mean)		13.38	12.97	13.50-16.20 g/dL	0.32	-0.78 1.90
PLT x10^3/uL (Mean)		277.33	286.58	150-439 x10^3/uL	0.62	0.48 -0.17

NEU x10^3/uL (Mean)	4.53	5.54	1.90-7.10 x10^3/uL	**0.03**	3.04 12.48
LYMP x10^3/uL (Mean)	1.71	1.85	1.30-3.76 x10^3/uL	0.38	1.10 4.10
MONO x10^3/uL (Mean)	0.88	0.93	0.35-1.01 x10^3/uL	0.86	3.33 9.71
CRP/ALB ratio (Mean± SD	1.92±0.14	0.82±0.15		0.20	1.12 0.27
ALSFRS-R (Mean± SD	14.23± 2.30	-		-	0.63 -0.19

ALS: Amyotrophic Lateral Sclerosis, CRP: C Reactive Protein ESR: Erythrocyte Sedimentation Rate, WBC: White Blood Cell, HGB: Hemoglobulin, PLT: Platelet, NEU: Neutrophil, LYMP: Lymphocyte, MONO: Monocyte, CAR: CRP/albümin ratio

Correlation Analysis

CAR was not found to correlate with the clinical parameters of ALS. As expected, ALSFRS scores and FAS scores were strongly correlated. FAS scores and the number of physiotherapy sessions were found to be associated, and FAS scores were found to be higher as physical therapy sessions increased. The duration of ALS disease increased as the age at onset of ALS decreased (Table 3).

Table 3. Correlation of CAR, ALSFRS-R and FAS with each other and other clinical parameters in patients with ALS

	n=45	CAR	ALSFRS-R	FAS	ALS Duration	ALS Onset Age	Physio Sessions Received
CAR	Pearson Correlation	1	0.10	0.20	-0.07	-0.01	-0.12
	Significance		0.50	0.17	0.64	0.92	0.43
ALSFRS-R	Pearson Correlation	0.10	1	**0.88**	0.03	-0.23	0.23
	Significance	0.50		**0.00**	0.80	0.12	0.11
FAS	Pearson Correlation	0.20	**0.88**	1	0.03	-0.21	**0.33**
	Significance	0.17	**0.00**		0.80	0.16	**0.02**
ALS Duration	Pearson Correlation	-0.07	0.03	0.03	1	**-0.75**	-0,13
	Significance	0.64	0.80	0.80		**0.00**	0.36
ALS Onset Age	Pearson Correlation	-0.01	-0.23	-0.21	**-0.75**	1	0.15
	Significance	0.92	0.12	0.16	**0.00**		0.32
Number of Physiotherapy Sessions Received	Pearson Correlation	-0.12	0.23	**0.33**	-0,13	0.15	1
	Significance	0.43	0.11	**0.02**	0.36	0.32	

CAR: CRP/albumin, ALSFRS-R: Amyotrophic Lateral Sclerosis Functional Rating Scale, FAS: Functional Ambulation Scale, ALS: Amyotrophic Lateral Sclerosis, N: Number

According to the AUC values, the power of the ROC curve analysis was poor. It revealed no statistically significant cut off values for CAR.

Table 4. ROC curve analysis for CAR values against ALSFRS-R and FAS scores

	Area	Std Error	Asymptotic Sig	Confidence Interval	
				Lower Bound	Upper Bound
ALSFRS-R	0.531	0.094	0.736	0.346	0.716
FAS	0.502	0.088	0.982	0.329	0.675

ROC: Receiver Operating Characteristic, CAR: CRP/albumin, ALSFRS-R: Amyotrophic Lateral Sclerosis Functional Rating Scale, FAS: Functional Ambulation Scale

Figure 1. CAR ROC curve and ALSFRS-R (left), and FAS scores (right)
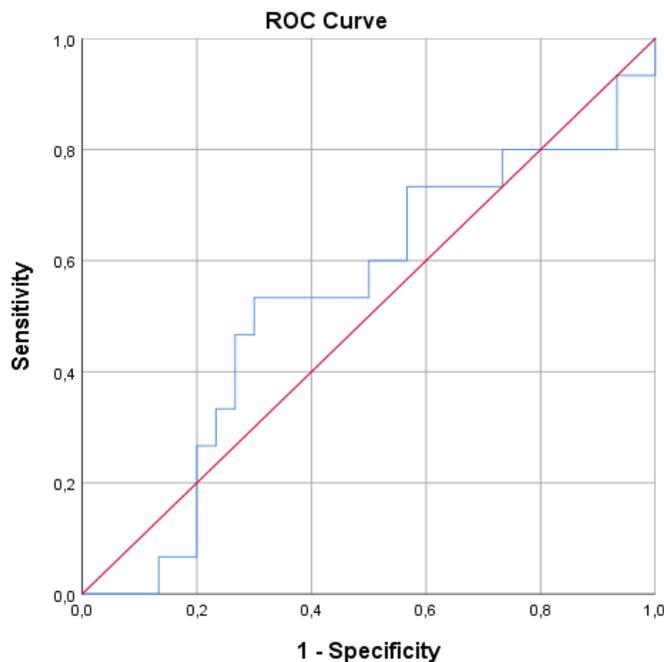
Discussion

A total of 90 people, 45 patients with ALS and 45 healthy people as the control group were included in the study. The mean CAR of patients with ALS was 1.92±0.14, while the mean CAR of control group 0.82±0,15 and there was no significant difference in mean CAR between the groups (p: 0.2). WBC and NEU were significantly higher in the ALS group compared to the control group. CAR was not found to correlate with the clinical parameters of ALS. FAS scores were found to be higher as the number of received physical therapy sessions increased.

Most of our patients with ALS were male (77.8%), and their mean age was 55.24±5.67, convenient with other studies[1,5,32]. The mean age at onset of ALS was 50.36±8.54 like found in many research[33,34]. The onset symptom of ALS was mostly walking disorder[35,36]. The mean ALS duration was 4.89 years[1,34]. Family history was low like in the other studies in the literature[1,37]. The majority of patients with ALS had no ambulation, and

those with a FAS score of 0 constituted the majority, similar to the literature[10,28]. The observed mortality rate of 33% was lower than the reported values in other studies, despite a mean disease duration of nearly 5 years[34,35]. This may be attributed to advances in intensive care, palliative care, home care services, and physiotherapy support.

There was no significant difference in mean CRP and albumin between ALS and the control group in our study. Albumin was also evaluated while evaluating 46 studies on lipid profile and iron homeostasis in patients with ALS in a meta-analysis published in 2021; no difference was found in albumin values in patients with ALS compared to control patients, similar to our study[22]. Creatinine and albumin values were compared in 45 patients diagnosed with ALS and 30 healthy controls in a study conducted in Romania in 2024; creatinine and albumin were found to be statistically low in the ALS group[23]. There may have been no statistical difference as the patients had not yet developed complications or malnutrition since we looked at the effect of creatinine and albumin values at the time of initial diagnosis on the functional scales. In a study conducted in Sweden in 2021, similar to our study[25], there was no difference in creatinine and CRP values at the time of initial diagnosis in patients with ALS compared to healthy control patients. Eleven studies were evaluated in a systematic review evaluating the effect of CRP level on the prognosis of ALS in 2022, and CRP levels were generally found to be higher than the control group and were associated with poor ALSFRS-R scores[26]. While CRP level was evaluated during the period when the clinic worsened and complications developed, when ALSFRS-R scores were evaluated in the hospital in most of these studies, CRP at the time of initial diagnosis was evaluated in our study.

Although CRP and albumin are frequently studied in patients with ALS, CAR has not been studied in patients with ALS in the literature. CAR has been studied in the literature in neurodegenerative diseases such as Parkinson's and multiple sclerosis. CAR was examined in 151 Parkinson's patients and 150 healthy controls in a study conducted in Turkey in 2019, and CAR was found to be significantly higher in the Parkinson's group compared to the control group[38]. CAR was examined in 120 MS patients and 62 healthy controls in a study conducted in Turkey in 2020, and it was found that CAR was significantly higher in the MS group than in the control group; It has been found to be associated with MS subtypes and disease activity[17]. This may be due to the fact that CRP and albumin were evaluated at the time of initial diagnosis, not in the advanced stages of the disease, and that complications or malnutrition had not yet developed during this period. The fact that the inflammatory response and nutritional status had not yet changed significantly in the early stages of the disease may have caused a statistically significant difference not to be observed between the groups. In addition, different inflammatory mechanisms in the pathophysiology of the diseases examined in previous studies may contribute to the significant increase in CAR, unlike ALS. Therefore, additional studies are needed to evaluate how CAR changes in ALS patients in advanced disease stages or in long-term follow-up studies.

We did not find a relationship between CAR and the number of physiotherapy received in our study. In our hospital, patients diagnosed with ALS were referred to the Physical Medicine and Rehabilitation outpatient clinic not when the disease was first diagnosed or in the early stages, but when the disease progressed and walking problems developed

or when fine dexterity in the hands began to deteriorate. Since we recorded the blood values at the time of the first diagnosis of the disease, we could not access the blood values before and after physiotherapy. Nevertheless, since patients were referred to physiotherapy at an advanced stage or when complications developed, it may indicate that the patient's physiotherapy application indicated a poor prognosis.

We compared the patients who received physiotherapy in our study with previous studies on physiotherapy in ALS since there is no study in the literature examining the relationship between CRP, CAR, or inflammatory parameters and physiotherapy in ALS. In our study, 16 patients with ALS were given standard physiotherapy consisting of joint range of motion, strengthening and stretching exercises, balance, and walking training 3 days a week for an average of 45 minutes for 8–10 weeks. There was no significant improvement in ALSFRS-R scores while there was an improvement in FAS scores at the end of treatment. Forty-eight patients with ALS were divided into two groups in a study conducted in 2018; while group 1 was given controlled and moderate-intensity aerobic exercise in addition to the standard treatment, rum and strengthening exercises, twice a week for 6 months; the second group was given standard treatment for the same period. ALSFRS-R scores increased significantly in both groups, but there was no difference between the groups at the end of treatment[39]. Eighteen patients with ALS were divided into two groups in a study conducted in 2019. Group 1 was subjected to moderate-intensity gradual aerobic exercise, 3 sessions a week for 4 weeks, each lasting 40 minutes; the second group did not receive any treatment. There was no significant change in ALSFRS-R scores in the treatment group compared to the control group at the end of the study[40].

Sixteen patients with ALS were divided into two groups in a study conducted in 2019; while the 1st group was subjected to medium and high intensity aerobic and strength exercises, 3 sessions a week for 12 weeks, each session lasting 50 minutes; the second group received standard care. There was no significant change in ALSFRS-R scores in the treatment group compared to the control group at the end of the study[27]. Ten studies on physiotherapy in patients with ALS implemented in the last 5 years and whose effectiveness was evaluated with ALSFRS-R were examined in a systematic review published in 2021 and it has been reported that physiotherapy generally increases the patient's function and quality of life[10]. The average ALSFRS-R score of patients receiving physical therapy was 32.75 in the review conducted in 2021, while it was 13.22 in our study. The reason for the lack of improvement in ALSFRS-R scores in our study may be that the patients receiving physical therapy had low initial ALSFRS-R scores and consisted of patients with severe disease.

Conclusion

This study is the first to evaluate CAR in patients with ALS. We examined CAR at the time of initial diagnosis and before infections and complications developed, rather than at the advanced stage of the disease, in our study. CAR measured at the time of diagnosis of ALS disease was not significantly higher than the control group, and we could not find a relationship between CAR and post treatment FAS scores. However, CAR may be an important parameter, especially in evaluating malnutrition and chronic inflammation

when the disease progresses and complications develop. Multicenter studies involving a larger number of patients are needed for this recommendation.

Limitations

The limitations of the study are that it is retrospective and single-center, the number of patients is relatively small since ALS is a rare disease, and the values before and after physiotherapy was not compared.

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Ergenlerde Çevrimiçi Oyun ve Psikososyal Faktörlerin İlişkisi: Yalnızlık, Benlik ve Kimlik Üzerine Bir İnceleme[*]

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Öz

Amaç: Bu araştırmada aşırı çevrimiçi oyun oynayan ergenlerin çevrimiçi kimlik keşifleri, çevrimiçi bağımsızlık, yalnızlık, sosyal yeterlilik ve benlik belirginliğine özgü ölçümlerin ele alınması ve bu değişkenler arasındaki ilişkilerin çevrimiçi video oyunlarının olumlu ve olumsuz yönleriyle bir arada ele alınarak geçerlik açısından incelenmesi amaçlanmıştır.

Yöntem: 15-25 yaş arası 258 erkek katılımcının oluşturduğu örnekleme Benlik Belirginliği, Çevrimiçi Kimlik Keşfi, Çevrimiçi Bağımsızlık, Aşırı Çevrimiçi Oyun Kullanımı, UCLA Yalnızlık, Yalnızlıktan Kaçış ve Sosyal Yeterlilik ve demografik bilgi formu uygulanmıştır. İlk olarak ölçümlerin Türk kültürüne uyarlaması adına açıklayıcı ve doğrulayıcı faktör analizleri ile incelenmiş, ardından çevrimiçi oyun oynamadaki yaşa ve oyun oynama süresine bağlı farklılıklarla değişkenler arası ilişkiler geçerlik açısından incelenmiştir.

Bulgular: Genel olarak çalışma kapsamında ele alınan tüm ölçümlerin açıklayıcı ve doğrulayıcı faktör analizlerinin sonuçları ölçümlerin Türkçe uygulamasının ergenlerde uygulanmasının geçerli ve güvenilir olduğunu destekler niteliktedir. Yaşa bağlı olarak beliren yetişkinlere kıyasla ergenlerin benlik belirginliklerinin düşük, kimlik keşiflerinin ise yüksek olduğu gözlemlenmiştir. Beliren yetişkinlik döneminde çevrimiçi bağımsızlık düzeyinin ve kendilerini sosyal olarak açma düzeyinin ergenlere kıyasla daha yüksek olduğu görülmüştür. Aşırı oyun oynayanların daha az oynayanlara kıyasla yalnızlıktan kaçış düzeyleri daha yüksek, çevrimiçi bağımsızlıkları daha düşük seviyede olduğu bulunmuştur. Ayrıca, yalnızlık ve yalnızlıktan kaçış aşırı oyun kullanımını pozitif yönde, çevrimiçi bağımsızlık ise negatif yönde yordamaktadır.

Sonuç: Çevrimiçi oyun oynamaya ve bu oyunlarda edinilen benlik, kimlikler, sosyal yeterlilik ve yalnızlık düzeylerine özgü ölçümlerin Türk kültürüne uyarlaması adına psikometrik özellikleri incelenmiş ve bu ölçümlerin ergenlik ve beliren yetişkinlik döneminde ülkemizde yapılacak araştırmalarda kullanılabilir nitelikte geçerli ve güvenilir olduğunu göstermiştir. Tüm elde edilen bulgular ergenlik dönemi ve kimlik oluşumu çerçevesinde değerlendirilerek tartışılmıştır.

Anahtar Sözcükler: Online kimlik keşfi, yalnızlık, sosyal yeterlilik, benlik kavramı, ergenlik, aşırı çevrimiçi oyun kullanımı.

The Relationship between Online Gaming and Psychosocial Factors in Adolescents: An Examination of Loneliness, Self-Concept, and Identity

Abstract

Aim: This study aims to examine the measures of online identity exploration, online self-identity, loneliness, social competence, self-concept clarity and excessive online game usage among adolescents who engage in excessive online gaming. Additionally, it explores the relationships between these variables by considering both the positive and negative aspects of online video games and evaluates the validity of these measures.

Method: A sample of 258 male participants aged between 15-25 years was administered the "Self-Concept Clarity, Online Identity Exploration, Online Self-Identity, Excessive Online Game Usage, UCLA Loneliness, Escaping from Loneliness, Social Competence, and Demographic Information Form." Initially, explanatory and confirmatory factor analyses were conducted to adapt the measures to Turkish culture. Subsequently, age and gaming duration-based differences, as well as inter-variable relationships, were evaluated in terms of validity.

Results: Overall, the results of explanatory and confirmatory factor analyses demonstrated that the Turkish adaptations of all the measures used in this study are valid and reliable for application among adolescents. Compared to emerging adults, adolescents exhibit lower self-concept clarity and higher levels of online identity exploration. During emerging adulthood, individuals demonstrate higher levels of online self-identity and social self-disclosure than adolescents. Additionally, those who engage in excessive online game usage tend to have higher levels of escaping from loneliness and lower levels of online self-identity compared to those who play less. Furthermore, UCLA loneliness and escaping from loneliness positively predict excessive online game usage, whereas online self-identity negatively predicts it.

Conclusion: The psychometric properties of the measures related to online gaming behaviors, self-concept, identity exploration, social competence, and loneliness levels were examined as part of their adaptation to Turkish culture. The findings indicate that these measures are valid and reliable for use in research conducted on adolescents and emerging adults in Turkey. All findings were discussed within the context of adolescence, identity formation, and developmental processes.

Keywords: Online identity exploration, loneliness, sociality, self-concept, adolescents, excessive online game usage.

Giriş

İnternet, yeni bir iletişim aracı olarak hayatımıza girdiğinden beri bir taraftan iletişimi kolaylaştırmakta, diğer yandan yüz yüze iletişimi bitirip asosyalliğe[1] ve sağladığı anonimlikle de yeni dijital kimlikler deneyerek başka biri olmaya yol açmaktadır[2]. 1990'dan itibaren büyüyen dijital oyun endüstrisi de çok sayıda oyun türüyle oyuncuların kimlik gelişimlerinde önemli yere sahiptir[3]. Bunlar arasında kimlik gelişimine en çok katkıda bulunan oyun türüyse Devasa Çok Oyunculu Çevrimiçi Rol Yapma Oyunları (Massively Multiplayer Online Role Playing Games-MMORPG) yer almaktadır. On binlerce oyuncuya oyun içi etkileşim imkânı sunan MMORPG'ler[4], oyuncunun aldığı her kararı gerçek zamanlı kaydetmekte ve hatalı kararlar geri alınamadığından adeta gerçek dünyanın bir simülasyonu görevini görmektedir[5]. Ne kadar "oyun" olarak görülse de sosyal ortamıyla oyun arkadaşlıklarının gerçekte de sürdürüldüğü, oyundaki görevler sebebiyle oyun içi topluluklar oluşturulan çevrimiçi iletişim araçlarıdır[2,5-7]. Oyunculara oluşturacakları karakterin fiziksel ve duygusal özelliklerini baştan yaratma imkânı sunan MMORPG'lerde iletişim bu karakterler üzerinden gerçekleşmektedir[8]. Oyuncular gerçek hayattaki kimliklerinden tamamen farklı, ideal benliklerini yansıtan bir kimlik deneyebilir[9,10] ve bu kimliğin oyuncular tarafından nasıl algılandığıyla ilgili anlık dönüş alabilirler[8]. Oyuncu için alternatif bir hayat sunan oyun evreni[11] çocuklar ve ergenlerin gelişimi için bir fırsata çevrildiğinde oyun karakterinin kimliğini özümseyen oyuncu

karşılaştığı durumlara o karakterin gözünden bakmaya başlayarak farklı yaklaşımlar üretebilir. Böylelikle bir doktor, bir bilim insanı veya bir mühendis gibi düşünerek yaratıcı bir öğrenme süreci geçirebilir[11]. Dolayısıyla, çevrimiçi ortam ergenlere sosyal etkileşimlerle yeni kimliklerini denemelerini ve ideal-gerçek benlik arasındaki tutarlılıkla kendilerini olumlu algılamalarını sağlamaktadır[12-14].

İnternet ortamında kimlik denemelerinin olumlu ve olumsuz yönüne değinen "İnternetten Etkilenen Sosyal Ödünleme Hipotezi" kimlik denemeleri sonucu yeni insanlarla tanışılması ve bu şekilde edinilen tecrübeyle çevrimdışı sosyal yeterliliğin gelişeceğini olumlu yönü olarak belirtilmektedir[6,15,16]. Olumsuz yönü olarak ise, ergenlerin çevrimiçi kimlikleriyle zamanla bütünleşmeleri ve bunun kişinin gerçek kimliğinin yerini almasıyla gerçek hayattaki sosyal yeterliliklerini kaybedebileceklerini, sanal kimlikleriyle sanal ilişkilere, oyun, kumar ve alışveriş bağımlılığı gibi aktivitelere yönelebilecekleri belirtilmektedir. Sahte kimliklerin uzun vadede öz-ideal benlik farkı sebebiyle majör depresif bozukluk ve aşırı internet kullanımıyla sosyal izolasyona yol açabileceği ve kararlı bir kimlik gelişimini engelleyebileceği de vurgulanmaktadır[10,16,17].

Son dönemlerde çevrimiçi oyunları aşırı şekilde oynamak günlük hayatın bir parçası haline geldiğinden, bu olumsuzluklar için çevrimiçi oyun bağımlılığı, patolojik çevrimiçi oyun kullanımı, problemli çevrimiçi oyun kullanımı gibi tanımlar yapılmıştır[18]. Tanımlardaki "bağımlılık" teriminin zamanla "aşırı" olarak değişmesinin sebebi çevrimiçi oyunları oyun kültürüne sahip, başarı amaçlı oynayan "hardcore oyuncular" dışında; günlük streslerden kurtulmak isteyen her yaştan "casual oyuncular" tarafından da oynanmasıdır. Çalışmalara göre aşırı oyun oynayanlar çevrimiçi rol yapma oyunlarında haftada 40,4 saat, günde yaklaşık 5 saat harcamaktayken, aşırı oyun oynamayanlarsa haftada 11,1 saat, günde yaklaşık 1,5 saat harcamaktadır[19]. Ayrıca, sosyalleşme ve yalnızlıktan kaçış istekleri aşırı çevrimiçi oyun kullanımlarını artırmaktadır[20]. Çevrimiçi oyunlar, özellikle ergenlik dönemdeki bireylerin kimliklerini keşfetmelerine katkı sağlarken, sanal ortamda yaratılan kimliklerle gerçek dünyadaki kimlik arasındaki dengeyi bulmak bazen zor olabilmektedir. Ancak, çevrimiçi oyunlarla edinilen sosyal ilişkiler ne oyunda geçirilen süreyle orantılıdır ne de yalnızlık için belirleyici ölçütlerden biridir. Burada asıl önemli olan insanların içinde bulundukları gruplardır[6]. Oyun türüne bağlı oyuncunun çevrimiçi bağımsızlık düzeyi düşükse oyuncularla sosyalliğin kaybedilmemesi için aşırı çevrimiçi oyun kullanılırken; çevrimiçi bağımsızlık düzeyi yüksekse gerçek hayattaki arkadaş bağı sebebiyle aşırı çevrimiçi oyun kullanılmaktadır[20]. Aşırı çevrimiçi oyun oynamanın ergenlerin psikososyal iyi oluşlarına olumlu katkı sağladığını belirten çalışmalara rastlansa da[21] özellikle yalnız ve asosyal ergenler tarafından kurtuluş olarak görülüp zamanla oluşan bağımlılıkla yaşam memnuniyetlerini düşürdüğü ve sosyal sorunların oluştuğu belirtilmektedir[22]. Her ne kadar oyuncular sosyalleşme ve yalnızlıktan kaçış istekleriyle aşırı çevrimiçi oyun kullanımını artırsa da[20], yalnızlıklarını gidermek için internete bağlananlar zamanla internetin olumsuzluklarına kapılmaktadırlar[23]. Bağımlılığa varan bu durumda çevrimiçi ilişkiler için yüz yüze ilişkilerden vazgeçilmektedir[24,25]. Böylelikle, zaten sosyallikten yakınan oyuncular sanal hayatındaki sosyalliği gerçek hayatındakine tercih etmekte ve sosyal ortamdan izole olup yalnızlıklarını artırmaktadırlar[22].

Özetle, aşırı çevrimiçi oyun kullanımına bağlı olarak video oyunlarının ergenler üzerindeki benlik ve kimlik gelişimlerinde, sosyal yeterlilik ve yalnızlık düzeyleri arasındaki ilişkilerin anlaşılması önem kazanmaktadır. Çevrimiçi oyunlar, bu faktörleri pozitif ya da negatif yönde etkileyebilir. Bu etkileşimlerin bilinmesi, ergenlerin çevrimiçi oyun bağımlılığı veya sağlıklı oyun alışkanlıkları oluşturma konusunda nasıl yönlendirilebileceği konusunda bilgi sağlaması açısından önemlidir. Erkekler genellikle aksiyon, yarış ve savaş oyunları ile strateji, MMORPG ve gerçek yaşama yakın oyunlar gibi oyunları, tercih ederlerken, kadınlar ise daha çok tek kişilik, kişiselleştirilebilir oyunlara ilgi gösterme eğilimindedir[26,27]. Ergenlerin akademik başarı, arkadaş grubuna aitlik gibi farklı kimlik arayışlarında gerçek benlikleri, sahip olmayı istedikleri ideal benlikleri ve toplumsal öğrenmelerle olması gerektiğini düşündükleri benliklerinden ideal ve gerçek benlik arasında tutarlılık ne kadar fazlaysa kendilerini olumlu algılamaları da artmaktadır[12-14]. İnternet oyunlarında oluşturulan karakterlerde ideal benliğin yansıtılmasıyla gerçek-ideal benlik uyumsuzluğu olduğunda kısa sürede rahatlatsa bile uzun vadede bu farkın majör depresif bozukluk, aşırı internet kullanımı ve sosyal izolasyona yol açtığı belirtilmektedir[10]. Gerçek hayatlarındaki kimlik denemelerinde başarısız olan kişiler, sanal kimlikleriyle sanal ilişkilere, oyun, kumar ve alışveriş bağımlılığı gibi aktivitelere yönelebilmektedir[17].

Ülkemizde ergenlerin internette kimlik denemelerine yönelik çalışmalar mevcut olsa da[17-28] bu çalışmalarda spesifik olarak çevrimiçi oyun oynamaya ve bu oyunlarda edinilen kimliklere özgü ölçümlere rastlanmamıştır. Çalışmalar bir taraftan oyun bağımlılığının olumsuz yönlerini vurgularken[15,17,20,28,29], diğer taraftan çevrimiçi rol yapma oyunlarının oyuncular arasında oluşan sosyal ağlarla yeni kimlikler edinilmesi gibi olumlu yönlerine de vurgu yapmaktadır[10,14,16,30]. Buradan hareketle çevrimiçi video oyunlarının hem olumlu hem de olumsuz yönleri bir arada değerlendirilerek, bunlara yönelik ölçümlerin geçerliğinin test edilmesinin konuya daha fazla açıklık getireceği düşünülmektedir.

Sonuç olarak bu çalışmada ergenlerin çevrimiçi oyun oynama alışkanlıkları ile yalnızlık, benlik algısı ve kimlik gelişimi gibi psikososyal faktörler arasındaki ilişkiyi incelemek ve çevrimiçi oyunlardan edinilen benlik, kimlik, sosyal yeterlilik ve yalnızlık düzeyleri ile ilgili ölçümlerin Türk kültürüne uygunluğu ve psikometrik özellikleri test edilmektedir. Bu amaç doğrultusunda yaşa ve günlük oyun oynama süresine bağlı farklılıklar ile araştırma kapsamında ele alınan değişkenler arasındaki ilişkiler test edilerek incelenmiştir. Araştırma kapsamında ele alınan hipotezler ise şu şekildedir;

H1: Ergenlik dönemindeki katılımcıların çevrimiçi kimlik denemeleri beliren yetişkinlik dönemindeki katılımcılardan daha fazla iken, beliren yetişkinlik dönemindeki katılımcıların benlik belirginlikleri daha yüksektir,

H2: Günlük çevrimiçi oyun oynama süresi 5 saat ve üzeri olan katılımcıların yalnızlık, yalnızlıktan kaçış ve sosyal yeterlilik düzeyleri daha az süre oynayanlara kıyasla yüksek olurken çevrimiçi bağımsızlık düzeyleri düşük olacaktır,

H3: Katılımcıların aşırı çevrimiçi oyun oynamaları ile yalnızlıkları, yalnızlıktan kaçış düzeyleri ve sosyal yeterlilikleri arasında pozitif, çevrimiçi kimlikleri (çevrimiçi bağımsızlık) arasında negatif yönde ilişki vardır,

H4: Yalnızlık, çevrimiçi kimlik keşfi, çevrimiçi kimlik (çevrimiçi bağımsızlık), sosyal yeterlilik, yalnızlıktan kaçış ve benlik belirginliği aşırı çevrimiçi oyun kullanımını yordayacaktır.

Gereç ve Yöntem

Katılımcılar

Örneklem 15-25 yaş arası ortaokul, lise, üniversite ve yüksek lisans öğrencilerinden oluşmaktadır. Veri çevrimiçi toplanmıştır. Genellikle kadınlar strateji, MMORPG ve gerçek yaşama yakın oyunları tek kişilik, kişiselleştirilebilir oyunlara göre daha az tercih etmektedirler[26,27]. Bu çalışmada da kadın katılımcı (n= 25, %8,8) ve evli erkek katılımcı sayısı (n= 1, %0,4) çok düşük olduğundan, analizler 258 bekar erkek katılımcı ile yürütülmüştür.

Katılımcılara çevrimiçi yada çevrimdışı oyunlardan en çok oynadıkları oyun türleri sorulmuş, ancak katılımcıların sadece tek bir oyun türünü oynamadığı belirlenmiştir. Katılımcıların %89,5'i 5 yıldan fazla, %9,3'ü 3 ile 5 yıl arasında oyun oynadıklarını belirtmişlerdir. Günlük oyun süresi açısından katılımcıların %46,5'i 5 saatten fazla, %33,7'si 3-4 saat ve 19.8'i 1-2 saat kadar oynadıklarını belirtmişlerdir. 15-25 yaş arası erkek katılımcıların %82,6'sı ailesi ile %17,4'ü ise yurtta veya öğrenci evinde yaşamaktadır.

Veri Toplama Araçları

Veri toplamak amacıyla demografik bilgi formu, benlik belirginliği ölçeği, çevrimiçi kimlik keşfi ölçeği, çevrimiçi bağımsızlık ölçeği, aşırı çevrimiçi oyun kullanımı ölçeği, UCLA yalnızlık ölçeği ve sosyal yeterlilik ölçeği kullanılmıştır.

Kişisel Bilgi Formu: Araştırmacı tarafından hazırlanan bilgi formunda yaş, cinsiyet, öğrenim durumu, kaç yıldır oyun oynandığı, günlük oyun oynama süresi, oyun oynama amacı ve oyun türünü öğrenmeye yönelik maddeler bulunmaktadır.

Benlik Belirginliği Ölçeği: Benlik Belirginliği Ölçeği, Campbell vd. tarafından katılımcıların, kendi benlik kavramlarını ne derece kesin bilgiye dayandırdıklarını ve ne derece güvenilir olarak tanımladıklarını ölçmek için geliştirilmiştir[31]. Ölçek tek boyutlu ve 12 maddeden oluşmakta ve 5'li Likert'le ölçülmektedir (1=Bana hiç uygun değil, 5=Bana tamamen uygun). Orijinal ölçeğin Cronbach Alpha güvenirlik katsayısı 0,86 olarak bulunmuştur. Sümer ve Güngör tarafından Türkçeye uyarlaması yapılan ölçeğin geçerlik çalışması yapılmamakla birlikte Cronbach Alpha güvenirlik katsayısı 0,89 olarak hesaplanmıştır[32] . Maddelerden 10 ve 12. Madde hariç tüm maddeler ters puanlanmaktadır. Puan arttıkça kişinin kendi benliğiyle ilgili belirli bir fikre sahip olduğu ve benlik belirginliğinin netlik kazandığı belirtilmektedir.

Çevrimiçi Kimlik Keşfi Ölçeği: Çevrimiçi Kimlik Keşfi Ölçeği, Davis tarafından katılımcıların internet ortamındaki kimliklerinin farklı yönlerini keşfetmelerini / denemelerini ve ifade ediş biçimlerini ölçmek için geliştirilmiştir[33]. Ölçek 7'li likert tipi bir yapıdadır ve 1=Tamamen yanlış, 7=Tamamen doğru şeklinde puanlanmaktadır. "Kendimi ifade etmenin farklı yollarını denemek için interneti kullanmayı severim" ve "Kendimi çevrimiçi ortamda daha iyi olarak gösterebiliyorum" şeklinde altı madde içeren tek boyutlu bir yapıdadır. Puan arttıkça kişinin kimlik keşifleri ve denemeleri yapmak

için interneti kullanma derecesinin arttığını göstermektedir. Davis ölçeğin Cronbach Alpha güvenirlik katsayısını 0,82 olarak bulmuştur.

Çevrimiçi Bağımsızlık: Çevrimiçi Bağımsızlık Ölçeği, Kim ve Kim tarafından katılımcıların çevrimiçi oyun ortamındaki diğer oyunculardan bağımsız bir şekilde aldıkları kararları ölçmek için kullanılmıştır[20]. Ölçeğin orijinal isminin (Online self-identity scale) çevirisiyle bu çalışmada kullanılan benzer isimdeki diğer ölçekle (Çevrimiçi Kimlik Keşfi ölçeği) karıştırılmaması adına ölçeğin ölçmeyi amaçladığı içerik açısından "Çevrimiçi Bağımsızlık" olarak isimlendirilmiştir. Ölçek 5'li likert tipi bir yapıdadır ve 1-Tamamen yanlış, 5-Tamamen doğru şeklinde puanlanmıştır. "Diğer oyuncuların tavsiyelerini körü körüne takip ederim" ve "Online oyunu yalnız başıma oynamak benim için zordur" şeklinde sekiz madde içeren tek boyutlu bir yapıdadır. Tüm maddeler ters puanlanmıştır. Puan arttıkça kişi kendi kararlarını diğerlerine bağlı olmaksızın kendi adına verdiğini göstererek, çevrimiçi diğer oyunculara olan bağımsızlığını göstermektedir. Ölçümün İngilizce sunulduğu makalede kullanılan bu ölçüm Korece bir makaleden çevrilerek uyarlanmış ve güvenirlik katsayısı için Cronbach Alpha düzeyi verilmeden yeterli düzeyde olduğu belirtilmiştir[20]. Korece makalede ise kullanılan kimlik ölçeği 5 alt ölçüm ve toplam 34 sorudan oluşmakta ve her bir alt ölçüm için Cronbach Alpha güvenirlik katsayısının 0,70 üzerinde olduğu görülmektedir[34].

Aşırı Çevrimiçi Oyun Kullanımı Ölçeği: Aşırı Çevrimiçi Oyun Kullanımı Ölçeği, Kim ve Kim tarafından katılımcıların çevrimiçi oyunları aşırı oynama ve oyunlara olan bağımlılık davranışlarını ölçmek için geliştirilmiştir[20]. Ölçek 5'li likert tipi bir yapıdadır ve 1-Tamamen yanlış, 5-Tamamen doğru şeklinde puanlanmıştır. "Aslen niyet ettiğimden daha uzun çevrimiçi oyunlar oynuyorum" ve "Korkarım ki, çevrimiçi oyunlar olmadan hayat sıkıcı, boş ve eğlencesiz olurdu" şeklinde 10 madde içeren tek boyutlu bir yapıdadır. Puan arttıkça kişinin aşırı ve bağımlı şekilde çevrimiçi oyun oynadığı hatta çevrimiçi oyunların kişinin yaşamının anlamı olduğu belirtilmektedir. Kim ve Kim ölçeğin Cronbach Alpha güvenirlik katsayısını 0,92 olarak bulmuştur.

UCLA Yalnızlık Ölçeği V3: UCLA Yalnızlık Ölçeği, Russell tarafından katılımcıların yalnızlık derecelerini ölçmek için geliştirilmiştir[35]. Ölçek tek boyutlu ve 20 maddeden oluşmakta ve 4'lü Likert'le ölçülmektedir (1-Hiç, 4-Her zaman). "Ne sıklıkla arkadaşlıktan yoksun hissediyorsunuz?" ve "Ne kadar sıklıkla başvurabileceğin kimse olmadığını düşünüyorsun?" örnek maddeleridir. Puan arttıkça kişinin yalnızlık derecesi de artmaktadır. Ölçeğin Cronbach Alpha güvenirlik katsayısı 0,89'la 0,94 arasında değişmektedir. Test-tekrar test güvenirliği açısından 1 yıllık bir süre boyunca yüksek derecede güvenilir olduğunu göstermiştir (r = ,73). Madde 1, 5, 6, 9, 10, 15, 16, 19 ve 20 ters puanlanmaktadır. İlk ölçek çalışması Russel tarafından 1980 yılında yapılmış ve Demir tarafından Türkçe'ye uyarlanarak Cronbach Alpha güvenirlik katsayısı 0,96 olarak hesaplanmıştır[36]. 1980 yılında yapılan ilk ölçek çalışmasının bazı maddeleri anlaşılamadığı için Russel tarafından 1996 yılında ölçeğin üçüncü sürümü olan UCLA Yalnızlık Ölçeği V3 geliştirilmiş ve çalışmada Russell tarafından geliştirilen bu ölçek kullanılmıştır[35].

Yalnızlıktan Kaçış Ölçeği: Yalnızlıktan Kaçış Ölçeği, Kim ve Kim tarafından katılımcıların yalnızlıktan kurtulmak için sergiledikleri oyun oynama alışkanlıklarını ölçmek için geliştirilmiştir[20]. Ölçek 5'li likert tipi bir yapıdadır ve 1-Tamamen yanlış, 5-

Tamamen doğru şeklinde puanlanmıştır. "Yalnız kaldığımda yalnızlığı gidermek için çevrimiçi oyunlar oynuyorum" şeklinde 3 madde içeren ve tek boyutlu bir yapıdadır. Puan arttıkça yalnız kalan kişinin yalnızlığını yenmek için çevrimiçi oyunlara yöneldiği belirtilmektedir. Kim ve Kim ölçeğin Cronbach Alpha güvenirlik katsayısını 0,87 olarak hesaplamıştır. Türkçe uyarlaması için yapılan açımlayıcı faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %83'ünü açıklayan tek faktörlü bir yapı bulunmuştur.

(KMO= 0,715; Bartlett's χ2 = 525,89; p<0,05).

Sosyal Yeterlilik Ölçeği: Sosyal Yeterlilik Ölçeği, Valkenburg ve Peter tarafından ergenlerin çevrimdışı sosyal yeterliliğini ölçmek için geliştirilmiştir[16]. Ölçek 5'li likert tipi bir yapıdadır ve katılımcıların geçmiş altı aylarına bakarak "Çok iyi tanımadığım biriyle konuşmaya başlamak" ne kadar zordu ne kadar kolaydı şeklinde değerlendirilerek 1-Çok zordu, 5-Çok kolaydı şeklinde puanlanmıştır. 19 maddeden oluşan bu ölçeğin dört alt boyutu bulunmaktadır; 1) iletişimi başlatma (initiation), 2) destekleme (supportiveness), 3) kendini açma (self-disclosure) ve 4) girişkenlik (assertiveness). Puan arttıkça kişinin çevrimdışı sosyal yeterliliğinin arttığını belirtmektedir. Valkenburg ve Peter'a göre ölçeğin Cronbach Alpha güvenirlik katsayısı 0,83'le 0,96 arasında değişmektedir.

Video oyunu oynayan 15-25 yaş arası 296 katılımcıdan internet üzerinden Google Formlar aracılığıyla gönüllülük esasına dayalı olarak çevrimiçi veri toplanmıştır. Bireyler çeşitli Facebook video oyun gruplarından gönüllü olarak seçilmiştir. Katılımcılar kişisel bilgilerinin alınmadığı ve verilerin toplu olarak değerlendirileceği konusunda bilgilendirilmiş onam formuyla bilgilendirilmişlerdir. Çalışmanın etik kurul izni Ufuk Üniversitesi, Etik Kurulundan alınarak (Tarih: 18/04/2019, Sayı: 2019/32) yürütülmüştür.

Bulgular

Ölçümlerin yapı geçerliğini test etmek amacıyla öncelikle açımlayıcı ve doğrulayıcı faktör analiziyle incelenmiştir. Ölçümlerin gruplar arası farklılık gösterip göstermediğini test etmek adına yaşa ve oyun süresine bağlı farklılıklar ele alınmıştır. Ölçüt-bağıntılı geçerliği test etmek içinse alanyazındaki çevrimiçi video oyunlarının hem olumlu hem de olumsuz yönleri bir arada ele alınarak değişkenler arası korelasyonlar incelenmiştir.

Güvenirlik Çalışması

Tüm ölçeklerin güvenirliğini test etmek için iç tutarlılık katsayısı olarak Cronbach Alpha ve iki-yarım güvenirliği analiz değerlerine bakılmıştır.

Cronbach Alfa Analizi

Ölçeklerin Türkçe versiyonlarının güvenirliği Cronbach Alpha iç tutarlılık katsayısıyla incelenmiş olup; Benlik Belirginliği Ölçeği için 0,89, Çevrimiçi Kimlik Keşfi Ölçeği için 0,77, Çevrimiçi Bağımsızlık Ölçeği için 0,72, Aşırı Çevrimiçi Oyun Kullanımı Ölçeği için 0,79, UCLA Yalnızlık Ölçeği V3 için 0,93 ve Yalnızlıktan Kaçış Ölçeği için 0,89 olarak hesaplanmıştır. Sosyal Yeterlilik Ölçeğinde ise 19. madde ölçeğin geçerlik güvenirliğini artırmak için analizden çıkarılmış ve Cronbach Alpha güvenirlik katsayısı 0,89, initiation (iletişimi başlatma) alt faktörü için 0,86, supportiveness (destekleme) alt faktörü için

0,87, self-disclosure (kendini açma) alt faktörü için 0,81 ve assertiveness (girişkenlik) alt faktörü içinse 0,86 olarak hesaplanmıştır.

İki – Yarım Güvenirliği

İki-yarım güvenirliği korelasyon sonuçlarında Benlik Belirginliği Ölçeği için ilk yarı (0,80) ve ikinci yarı (0,80) arasındaki korelasyon katsayısı 0,79, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,88'dir. Çevrimiçi Kimlik Keşfi Ölçeği için ilk yarı (0,74) ve ikinci yarı (0,56) arasındaki korelasyon katsayısı 0,58, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,74'tür. Çevrimiçi Bağımsızlık Ölçeği için ilk yarı (0,55) ve ikinci yarı (0,68) arasındaki korelasyon katsayısı 0,45, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,62'dir. Aşırı Çevrimiçi Oyun Kullanımı Ölçeği için ilk yarı (0,63) ve ikinci yarı (0,68) arasındaki korelasyon katsayısı 0,63, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,77'dir. UCLA Yalnızlık Ölçeği V3 için ilk yarı (0,88) ve ikinci yarı (0,86) arasındaki korelasyon katsayısı 0,87, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,93'tür. Yalnızlıktan Kaçış Ölçeği için ilk yarı (0,92) ve ikinci yarı (1,00) arasındaki korelasyon katsayısı 0,71, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,83'tür. Sosyal Yeterlilik Ölçeği içinse ilk yarı (0,84) ve ikinci yarı (0,82) arasındaki korelasyon katsayısı 0,70, tüm ölçeğin Spearman-Brown güvenirlik katsayısı ise 0,82'dir.

Yapı Geçerliği

Araştırma kapsamında kullanılan çevrimiçi video oyun oynama düzeylerine özgü benlik, kimlik, yalnızlık ve sosyal yeterlilik ölçüm araçlarının Türk kültürüne uyarlamak ve psikometrik özelliklerini ergenler üzerinde incelemek adına önce yapı ve kapsam geçerliği için açımlayıcı faktör analiziyle bakılmış, ardından doğrulayıcı faktör analiziyle test edilmiştir. Aynı örneklem üzerinde de AFA ve DFA yapılabilmektedir[37]. Bu bilgilerden hareketle araştırmadaki örneklem sayısı (n=258) ikiye bölünerek araştırma yapılacak düzeyde olmadığı için aynı örneklem üzerinde AFA ve DFA çalışmaları yapılmıştır.

Benlik Belirginliği Ölçeğinin Faktör Analizi Sonuçları

Benlik Belirginliği Ölçeği Türkçeye Sümer ve Güngör tarafından uyarlanmış olsa da bu çalışma kapsamında geçerlik çalışmasının yapılmadığı belirtilmiştir[32]. Bu nedenle Benlik Belirginliği Ölçeğinin yapı ve kapsam geçerliğini test etmek amacıyla ilk olarak açımlayıcı ve sonrasında doğrulayıcı faktör analiziyle ele alınmıştır. 12 maddelik ölçek için ilk yapılan Varimax yöntemiyle döndürmeli faktör analizi sonucunda Kaiser-Meyer-Olkin (KMO) değeriyle (0,896) verinin faktör analizine uygun olduğunu göstermiştir. Faktör sayısı kararı, özdeğerler, açıklanan varyans oranı, güvenirlik değerleri ve özdeğerlerin grafik dağılımı incelenerek verilmiştir. Faktör sayısı sınırlanmadan yapılan ilk faktör analizi sonuçlarına göre özdeğeri 1'den büyük toplam varyansın %53'ünü açıklayan iki faktör bulunmuştur (KMO=0,896; $Bartlett's\ \chi2$=1238.55; p<0,05). Bunlar sırasıyla birinci faktör için %44 (özdeğer= 5,32) ve ikinci faktör için %9 (özdeğer=1,15) varyans açıklamaktadır. Davis'in çalışmasına[26] (Davis KE, 2013) benzer olarak 12. maddenin faktör yükünün 0,30'un altında olduğundan 12. madde çıkarılarak yeniden analiz yapılmış ve 11 maddelik ölçeğin açıklayıcı faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %57'sini açıklayan iki faktör bulunmuştur (KMO=0,902;

Bartlett's $\chi2=1223,40$; *p<0,05*). Bunlar sırasıyla birinci faktör için %48 (özdeğer=5,30) ve ikinci faktör için %9 (özdeğer= 1,00) varyans açıklamaktadır. Çalışmada kullanılan ölçek tek faktörlü olduğundan dolayı varimax rotasyonla tek faktörlü yapıya zorlanmış ve sonuçta toplam varyansın %48'ini açıklayan tek faktörlü bir yapı elde edilmiştir. Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve tek faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), *χ2* (40)=94,524, *p=0,000*, *χ2/df* =2,363, *CFI*=0,954, *RMSEA*=0,073, 90% CI [0,054 – 0,092].

Tablo 1. Benlik belirginliği ölçeğinin faktör analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,902; Bartlett's χ2=1223,40; p<0,05
	Tek faktörlü yapı varimax rotasyonla %48 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	- χ²(40)=94,524, p=0,000
	χ2/df =2,363
	CFI=0,954
	RMSEA=0,073, 90% CI [0,054 – 0,092]

Çevrimiçi Kimlik Keşfi Ölçeğinin Faktör Analizi Sonuçları

Çevrimiçi Kimlik Keşfi Ölçeğinin Türkçe uyarlaması için ilk olarak yapılan açımlayıcı faktör analizi sonucunda özdeğeri 1'den büyük toplam varyansın %48'ini açıklayan tek faktörlü bir yapı bulunmuştur (*KMO=0,801; Bartlett's* $\chi2=406,97$; *p<0,05*). Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve tek faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), *χ2* (8)=13,124, *p=0,108*, *χ2/df=1,641*, *CFI*=0,987, *RMSEA*=0,050, 90% CI [0,000 – 0,097].

Tablo 2. Çevrimiçi kimlik keşfi ölçeğinin faktör analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,801; Bartlett's χ2=406,97; p<0,05
	Tek faktörlü yapı %48 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	χ2 (8)=13,124, p=0,108
	χ2/df=1,641
	CFI=0,987
	RMSEA=0,050, 90% CI [0,000 – 0,097]

Çevrimiçi Bağımsızlık Ölçeğinin Faktör Analizi Sonuçları

Çevrimiçi Bağımsızlık Ölçeğinin Türkçe uyarlaması için yapılan faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %52'sini açıklayan iki faktör bulunmuştur (*KMO=0,779; Bartlett's* $\chi2=382,06$; *p<0,5*). Bunlar sırasıyla birinci faktör için %36 (özdeğer=2,88) ve ikinci faktör için %15 (özdeğer=1,27) varyans açıklamaktadır. Çalışmada kullanılan ölçek tek faktörlü olduğundan dolayı varimax rotasyonla tek

faktörlü ve toplam varyansın %36'sını açıklayan bir yapı elde edilmiştir. Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve tek faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), $\chi2$ (19)=38,348, p=0,005, $\chi2/df$ = 2,018, CFI=0,946, $RMSEA$=0,063, 90% CI [0,033 - 0,092].

Tablo 3. Çevrimiçi Bağımsızlık Ölçeğinin Faktör Analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,779; Bartlett's χ2=382,06; p<0,5
	Tek faktörlü yapı varimax rotasyonla %36 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	χ2 (19)=38,348, p=0,005
	χ2/df=2,018
	CFI=0,946
	RMSEA=0,063, 90% CI [0,033 - 0,092].

Aşırı Çevrimiçi Oyun Kullanımı Ölçeğinin Faktör Analizi Sonuçları

Aşırı Çevrimiçi Oyun Kullanımı Ölçeğinin Türkçe uyarlaması için yapılan faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %47'sini açıklayan iki faktör bulunmuştur (KMO=0,825; $Bartlett's$ $\chi2$=564,98; p<0,05). Bunlar sırasıyla birinci faktör için %35 (özdeğer=3,57) ve ikinci faktör için %11 (özdeğer=1,14) varyans açıklamaktadır. Çalışmada kullanılan ölçek tek faktörlü olduğundan dolayı varimax rotasyonla tek faktörlü ve toplam varyansın %35'ini açıklayan bir yapı elde edilmiştir. Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve tek faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), $\chi2$ (32)=64,46, p=0,000, $\chi2/df$=2,01, CFI=0,939, $RMSEA$=0,063, 90% CI [0,040 - 0,085].

Tablo 4. Aşırı Çevrimiçi Oyun Kullanımı Ölçeğinin Faktör Analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,825; Bartlett's χ2=564,98; p<0,05
	Tek faktörlü yapı varimax rotasyonla %35 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	χ2 (32)=64,46, p=0,000
	χ2/df=2,01
	CFI=0,939
	RMSEA=0,063, 90% CI [0,040 - 0,085]

UCLA Yalnızlık Ölçeği V3'ün Faktör Analizi Sonuçları

UCLA Yalnızlık Ölçeği V3'ün Türkçe uyarlaması için yapılan faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %59'unu açıklayan üç faktör bulunmuştur (KMO=0,944; $Bartlett's$ $\chi2$=2741,20; p<0,05). Bunlar sırasıyla birinci faktör için %45 (özdeğer=9,05), ikinci faktör için %8 (özdeğer=1,60) ve üçüncü faktör için %5

(özdeğer=1,14) varyans açıklamaktadır. Çalışmada kullanılan ölçek tek faktörlü olduğundan dolayı varimax rotasyonla tek faktörlü ve toplam varyansın %45'ini açıklayan bir yapı elde edilmiştir. Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve tek faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), $\chi2$ (158)=319,43, p=0,000, $\chi2/df$=2,022, CFI=0,939, $RMSEA$=0,063, 90% CI [0,053 - 0,073].

Tablo 5. UCLA Yalnızlık Ölçeği V3'ün Faktör Analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,944; Bartlett's χ2=2741,20; p<0,05
	Tek faktörlü yapı varimax rotasyonla %45 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	χ2 (158)=319,43, p=0,000
	χ2/df=2,022
	CFI=0,939
	RMSEA=0,063, 90% CI [0,053 - 0,073]

Sosyal Yeterlilik Ölçeğinin Faktör Analizi Sonuçları

Sosyal Yeterlilik Ölçeğinin Türkçe uyarlaması için yapılan faktör analizi sonucuna göre özdeğeri 1'den büyük toplam varyansın %66'sını açıklayan dört faktör bulunmuştur (*KMO*=0,865; *Bartlett's χ2*=2540,63; *p*<0,05). Bunlar sırasıyla birinci faktör için %37 (özdeğer=6,66), ikinci faktör için %14 (özdeğer=2,54) üçüncü faktör için %8 (özdeğer=1,59) ve dördüncü faktör için %6 (özdeğer=1,21) varyans açıklamaktadır. Ölçekte yer alan maddelerden 1, 2, 3, 4 ve 5. maddeler, "İletişimi Başlatma", 6,7,8,9 ve 10. maddeler "Destekleme", 11,12,13, 14 ve 15.maddeler "Kendini Açma", 16,17 ve 18. maddeler ise "Girişkenlik" boyutu olarak adlandırılmıştır. Ölçeğin geçerlik çalışması için yapılan açımlayıcı faktör analizi sonrasında ayrıca doğrulayıcı faktör analiziyle de bakılmış ve dört faktörlü yapının kabul edilebilir olduğunu göstermiştir (15,37), $\chi2$ (128)=243,4, p=0,000, $\chi2/df$=1,902, CFI=0,953, $RMSEA$=0,059, 90% CI [0,048 - 0,070].

Tablo 6. Sosyal Yeterlilik Ölçeğinin Faktör Analizi

Analiz Türü	Sonuçlar
Açımlayıcı Faktör Analizi (EFA)	KMO=0,865; Bartlett's χ2=2540,63; p<0,05
	Dört faktörlü yapı %66 varyans açıklamaktadır.
Doğrulayıcı Faktör Analizi (CFA)	χ2 (128)=243,4, p=0,000
	χ2/df=1,902
	CFI=0,953
	RMSEA=0,059, 90% CI [0,048 - 0,070]

Gruplar Arası Farklılıklar

Ölçümlerin gruplar arası ayrışmasına yönelik geçerliğini test etmek amacıyla çevrimiçi video oyunlarının hem olumlu hem de olumsuz yönlerinin bir arada ele alınarak incelenmesi adına hipotez testleri sırasıyla sunulmuştur.

Yaşa Bağlı Farklılıklar

Yaşa göre katılımcıların aşırı oyun oynamaları, yalnızlıkları, yalnızlıktan kaçış düzeyleri, çevrimiçi bağımsızlık, çevrimiçi kimlik keşfi, sosyal yeterlilikleri (iletişimi başlatma, destekleme, kendini açma, girişkenlik alt boyutları), benlik belirginlikleri ve günlük oyun oynama süreleri arasında farklılıkların olup olmadığının belirlenmesi için bağımsız gruplar t-testi analiziyle bakılmış ve Cohen's d ile etki gücü ölçülmüştür.

Tablo 7. Yaşın bağımlı değişkenler üzerindeki farklılıkları

	Yaş	n	$\bar{X}$	Ss	T	Cohen's d
Çevrim İçi Bağımsızlık	15-18	135	31,17	4,851	-2,420*	-0,302
	19-25	123	32,65	4,969		
SY Kendini Açma	15-18	135	12,33	5,055	-2,687**	-0,335
	19-25	123	14,08	5,439		
Benlik Belirginliği	15-18	135	50,92	15,191	-2,014*	-0,251
	19-25	123	54,70	14,918		

Not: Tabloda sadece istatistiksel olarak anlamlı sonuçlar sunulmuştur. SY: Sosyal Yeterlilik; *p<0,05*

Tablo 7'de sunulduğu üzere yaşa bağlı farklılıkların analiz sonucunda çevrimiçi bağımsızlık düzeyinde (t=-2,420, p=0,016), sosyal yeterliliğin kendini açma alt boyutunda (t=-2,687, p=0,008) ve benlik belirginliğinde (t=-2,014, p=0,045) istatistiksel olarak anlamlı farklılık bulunmaktadır. Buna göre 19-25 yaş arası katılımcıların çevrimiçi bağımsızlık ($\bar{X}$=32,65), sosyal yeterliliklerinin kendini açma alt boyutu ($\bar{X}$=14,08) ve benlik belirginlikleri ($\bar{X}$=54,70), 15-18 yaş arası katılımcıların çevrimiçi bağımsızlık ($\bar{X}$=31,17), sosyal yeterliliklerinin kendini açma alt boyutlarından ($\bar{X}$=12,33) ve benlik belirginliklerinden ($\bar{X}$=50,92) daha fazladır.

Günlük Oyun Oynama Süresine Bağlı Farklılıklar

Katılımcıların günlük oyun süresine bağlı olarak (1-2 saat; 3-4 saat; 5 saat ve üzeri) aşırı oyun oynama, yalnızlık düzeyi, yalnızlıktan kaçış düzeyi, çevrimiçi bağımsızlık, çevrimiçi kimlik keşfi, sosyal yeterlilik ve benlik belirginliği üzerinde anlamlı farklılığının olup olmadığının belirlenmesi için tek yönlü varyans analizi (ANOVA) yapılmıştır.

Tablo 8. Günlük oyun oynama süresine bağlı farklılıklar

	Günde 1-2 saat			Günde 3-4 saat			Günde 5 saat ve üzeri			$F_{(2,255)}$	p	η^2
	n	$\bar{X}$	SD	n	$\bar{X}$	SD	n	$\bar{X}$	SD			
Aşırı Oyun Kullanımı	51	15,73	5,219	87	20,57	6,792	120	22,30	7,612	16,168	0,000*	0,126
Yalnızlıktan Kaçış	51	6,24	3,479	87	8,18	4,051	120	8,24	4,106	5,101	0,007*	0,040
Çevrim İçi Bağımsızlık	51	32,94	4,483	87	32,49	4,359	120	30,98	5,407	3,929	0,021*	0,030

Not: Tabloda sadece istatistiksel olarak anlamlı sonuçlar sunulmuştur *p<0,05
Yapılan ANOVA testi sonuçlarına göre katılımcıların günlük oyun süreleriyle aşırı oyun kullanımı [$F_{(2,255)}$=16,168, *p*=0,000], yalnızlıktan kaçışları ($F_{(2,255)}$=5,101, *p*=0,007) ve çevrimiçi bağımsızlık ($F_{(2,255)}$=3,929, *p*= 0,021) arasında anlamlı bir farklılık bulunmaktadır. Gruplararası farklılıklar incelendiğinde aşırı oyun kullanımı için farklılığın 1-2 saatle (*X*=15,73) 3-4 saat (*X*=20,57) ve 1-2 saatle (*X*=15,73) 5 saat ve üzeri (*X*=22,30) arasında kaynaklandığı bulunmuştur. Yalnızlıktan kaçış için farklılığın 1-2 saatle (*X*=6,24) 3-4 saat (*X*=8,18) ve 1-2 saatle (*X*=6,24) 5 saat ve üzeri (*X*=8,24) arasında kaynaklandığı bulunmuştur. Çevrimiçi bağımsızlık için farklılığın 1-2 saatle (*X*=32,94) 5 saat ve üzeri (*X*=30,98) arasında kaynaklandığı bulunmuştur. Bu veriler ışığında günlük oyun süresi incelendiğinde günlük 1-2 saat video oyunu oynayanların çevrimiçi bağımsızlıkları (*X*=32,94); 5 saat ve üzeri günlük video oyunu oynayanların aşırı oyun kullanımları (*X*=22,30) ve yalnızlıktan kaçışları (*X*=8,24) diğer gruplardan fazladır.

Değişkenler Arasındaki Korelasyonlar

Değişkenler arası ilişkilerin yönünün belirlenmesi için Pearson korelasyon testi yapılmış ve Tablo 9'da sunulmuştur. Buna göre Çevrimiçi kimlik keşfiyle yaş (*r*=-0,162, *p*<0,01) ve benlik belirginliği (*r*=-0,186, *p*<0,01) arasında negatif yönde anlamlı ilişki bulunmuştur. Yalnızlıkla çevrimiçi kimlik keşfi (*r*=0,139, *p*<0,05), aşırı oyun kullanımı (*r*=0,322, *p*<0,01) ve yalnızlıktan kaçışla aşırı oyun kullanımı (*r*=0,467, *p*<0,01) arasında pozitif yönde anlamlı ilişki bulunmuştur. Ayrıca, aşırı oyun kullanımıyla sosyal yeterliliğin alt boyutları olan iletişimi başlatma (*r*=-0,205, *p*<0,01), kendini açma (*r*=-0,155, *p*<0,05) ve girişkenlikle (*r*=-0,171, *p*<0,01) çevrimiçi bağımsızlık (*r*=-0,360, *p*<0,01) arasında negatif yönde anlamlı ilişki bulunmuştur.

Tablo 9. Değişkenler arasındaki korelasyonlar

	1	2	3	4	5	6	7	8	9	10	11	12
Yaş	1											
Günlük Oyun Süresi	-,125*	1										
Benlik Belirginliği	,151*	-,040	1									
Çevrim İçi Kimlik Keşfi	-,162**	,081	-,186**	1								
Çevrim İçi Bağımsızlık	,238**	-,203**	,363**	-,206**	1							
Aşırı Çevrim İçi Oyun Kullanımı	-,034	,327**	-,336**	,251**	-,360**	1						
UCLA Yalnızlık	-,042	-,041	-,558**	,139*	-,186**	,322**	1					
SY İletişimi Başlatma	,095	,059	,379**	,011	,180**	-,205**	-,581**	1				
SY Destekleme	,002	,028	,140*	,049	,156*	-,042	-,296**	,355**	1			
SY Kendini Açma	,193**	-,011	,285**	-,032	,166**	-,155*	-,422**	,567**	,271**	1		
SY Girişkenlik	,081	,036	,313**	-,058	,206**	-,171**	-,401**	,519**	,400**	,361**	1	
Yalnızlıktan Kaçış	-,029	,167**	-,227**	,255**	-,287**	,467**	,340**	-,164**	-,082	-,066	-,137*	1
Ortalama (X)	19,03	2,62	52,72	25,91	31,88	20,42	45,30	16,69	21,45	13,16	12,58	7,83
Ss	3,004	1,295	15,15	8,336	4,953	7,321	13,49	5,032	3,790	5,304	2,772	4,034

Not: N=258, *p<0,05, **p<0,01 SY: Sosyal Yeterlilik

Aşırı Oyun Kullanımını Yordayan Değişkenlere İlişkin Hiyerarşik Regresyon Analizi

Aşırı oyun kullanımını yordayan değişkenleri belirlemek amacıyla yapılan hiyerarşik regresyon analizinde ilk aşamada olumsuz durum belirten yalnızlık ve yalnızlıktan kaçış değişkenleri eklenmiş, ardından ikinci aşamada çevrimiçi kimlik keşfi, çevrimiçi bağımsızlık ve sosyal yeterliliğin iletişimi başlatma alt boyutu gibi olumlu durumları belirten değişkenler dahil edilmiştir. Sonucunda bağımsız değişkenler arasındaki çoklu doğrusallık testi için VIF değerlerine bakılmış ve 3.0'den düşük olduğu görülmüştür.

Tablo 10. Aşırı oyun kullanımını yordayan değişkenlerin hiyerarşik regresyon analizi

Model	Yordayan	B	SE	β	t	F	R²	ΔR²
1	**Sabit**	10.139	1.433		7.077	42.141	0.248	0.243
	Yalnızlık	0.100	0.031	0.184*	3.195			
	Yalnızlıktan Kaçış	0.734	0.105	0.405*	7.006			
2	**Sabit**	20.892	0.062		5.143	22.324	0.307	0.293
	Yalnızlık	0.0074	0.037	0.137*	2.007			
	Yalnızlıktan Kaçış	0.594	0.106	0.327*	5.583			
	Çevrimiçi Kimlik Keşfi	0.092	0.049	0.105	1.902			
	Çevrimiçi Bağımsızlık	-0.315	0.083	-0.213*	-3.804			
	SY İletişimi Başlatma	-0.050	0.095	-0.035	-0.529			

*Not: *p<.05*

Regresyon analizi sonucunda denkleme ilk aşamada eklenen değişkenlerin genel olarak modele katkısı anlamlıdır ($F_{(2,255)=}$ 42,141, $p<0,05$). Yalnızlık ($β$=0,184 $p<0,05$) ve Yalnızlıktan kaçış ($β$=0,405, $p<0,05$) ölçeklerinin aşırı oyun kullanımını pozitif yönde anlamlı olarak yordadığı bulunmuştur. Bu değiskenleri, bağımlı değiskendeki varyansın %24,8'ini açıkladığı ve bu artışın anlamlı olduğu görülmektedir ($R²$=0,248, F değişim (2,255)=42,141, $p<0,05$).

Modele ikinci aşamada eklenen değişkenlerin genel olarak modele katkısı anlamlıdır ($F_{(5,252)=}$22,324, $p<0,05$). Bu aşamada Yalnızlık ($β$=0,137, $p<0,05$) ve Yalnızlıktan kaçış ($β$=0,327, $p<0,05$) değişkenlerinin pozitif yönde yordamaya devam ederken, sadece Çevrimiçi bağımsızlık ölçeğinin ($β$=-0,213, $p<0,05$) aşırı oyun kullanımını negatif yönde anlamlı olarak yordadığı bulunmuştur. Bu değişkenlerin, bağımlı değişkendeki varyansın %30,7'sini açıkladığı ve bu artışın anlamlı olduğu görülmektedir ($R²$ =0,307, F değişim (5,252)=7,097, $p<0,05$).

Beta katsayılarına bakıldığında yalnızlıktaki bir birim artışın aşırı oyun kullanımında 0,137'lik bir artışa ($β$=0,137, $p<0,05$); yalnızlıktan kaçıştaki bir birim artışın aşırı oyun kullanımında 0,327'lik bir artışa ($β$=0,327, $p<0,05$); çevrimiçi bağımsızlıktaki bir birim artışın aşırı oyun kullanımında -0,213'lük bir azalışa ($β$=-0,213, $p<0,05$) yol açtığı görülmektedir.

Tartışma

Araştırmada aşırı çevrimiçi oyun kullanımı ve buna bağlı olarak video oyunlarını oynayan ergenlerin çevrimiçi kimlik keşifleriyle çevrimiçi bağımsızlık düzeyleri, yalnızlık, sosyal yeterlilik ve benlik belirginliği düzeylerini spesifik düzeyde ölçmeye

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yönelik ölçüm araçlarının Türk kültürüne uyarlanması ve bu ölçümlerin geçerliğini test etmek amacıyla çevrimiçi video oyunlarının hem olumlu hem de olumsuz yönlerinin bir arada ele alınarak incelenmesi amaçlanmıştır. Genel olarak çalışma kapsamında ele alınan tüm ölçümlerin hem açıklayıcı hem de doğrulayıcı faktör analizlerinin sonuçları ölçümlerin Türkçe uyarlamalarının ergenlerde uygulanmasının geçerli ve güvenilir olduğunu destekler niteliktedir. Araştırmada kullanılan ölçümlerin geçerliğini test etmek amacıyla yaşa ve günlük oyun oynama süresine bağlı farklılıklara bakılmıştır.

Ölçümlerin yaşa bağlı farklılıklarında yaş gruplarına (ergenlik ve beliren yetişkinlik dönemlerine) bağlı olarak çevrimiçi kimlik keşifleri ve benlik belirginlikleri arasında anlamlı düzeyde fark bulunacağı varsayılmış, fakat yaşla çevrimiçi kimlik keşifleri arasında anlamlı bir farklılık elde edilmemiştir. Ancak korelasyon sonuçları incelendiğinde yaşla çevrimiçi kimlik keşifleri arasında düşük düzeyde negatif yönlü anlamlı korelasyon olduğu görülmektedir. Kimlik değişiminin en çok 18-25 yaş arasında olduğunu ve üniversite son sınıf öğrencilerinin kimlik kazanımlarının lise öğrencilerine göre daha olası olduğunu belirtilmektedir[38-40]. İnternetin sunduğu anonimlik ise bu kimlik keşifleri için ideal ortamı sağlamaktadır[41]. Dolayısıyla, ergenlik veya beliren yetişkinlik dönemine bağlı olarak her ne kadar çevrimiçi kimlik arayışında farklılık elde edilmese de yaşla kimlik arayışı arasında negatif yönde bir ilişki elde edilmesi yine de kimlik arayışının daha çok ergenlik döneminde olduğunu işaret ettiği düşünülmektedir. Ayrıca, yaşla benlik belirginliği arasında da pozitif yönlü bir ilişki elde edilmiştir. Daha önce yapılan çalışmalar da kimlik keşifleri ve bunun sonucunda edinilen benliğin daha çok 18-25 yaş arasında şekillendiğini belirtmektedirler[33-38-40]. Dolayısıyla, çevrimiçi kimlik keşifleriyle benlik belirginliği arasındaki negatif korelasyon lise dönemindeki kişilerin kimliklerini keşif sürecinde olduklarından ve benlik belirginliklerinin henüz şekillenmediğinden dolayı kimlik keşfi oranının daha yüksek olduğunu belirten çalışmalarla desteklenmektedir[28-33]. Özellikle bağımlı oyuncuların sanal ortamdaki oyun içi karakterini ideal benlikleri doğrultusunda şekillendirdikleri belirtilmektedir[17]. Dolayısıyla çevrimiçi kimlik keşifleriyle yalnızlık arasındaki pozitif yöndeki ilişki, yalnız olan, benlik ve kimlik açısından net olmayan, yeni kimlikler arayan ergenlere, kendilerinin farklı yönlerini keşfetmek için bir yol sunduğunu belirten diğer araştırma bulgularıyla uyumludur[14,24,29,41]. Bununla birlikte, MMORPG'lerin eğitim alanında kullanılması amacıyla Classroom Multiplayer Presential Role Playing Game (CMPRPG) modelini geliştiren araştırmacılar bu model ile ekoloji öğreniminde öğrencilerin katılımını artırma ve öğrenmeyi desteklemelerine yardımcı olmuşlardır[42]. Prososyal davranışları destekleyen oyunlar, empati, iş birliği, yardımlaşma gibi duygu ve düşünceler geliştiren oyuncuların sosyal etkileşimleri olumlu şekilde geliştirmektedir[43]. Ayrıca oyun karakterinin kimliğini benimseyen oyuncu karşılaştığı durumlara o karakterin gözünden bakarak farklı yaklaşımlar üretebilir. Böylelikle bir doktor, bilim insanı veya mühendis gibi düşünerek yaratıcı bir öğrenme süreci geçirebilir[11].

Yaşa bağlı bir diğer sonuç ergenlere kıyasla beliren yetişkinlerin çevrimiçi bağımsızlık ve kendini açma düzeyleriyle benlik belirginliklerinin daha yüksek olmasıdır. Çevrimiçi oyunlarda oyuncuların, diğer insanlarla bağlantıda olma isteği, insanlarla gerçek dünyada yüz yüze bağ kurmalarına ve çeşitli sosyal topluluklara katılmalarına imkân sağlayabilmekte ve siber ortamdaki bu tanışmalar gerçek arkadaşlıklara ya da yüz yüze

iletişime dönüşebilmektedir[2-7]. Gerçek dünyadan sosyal gruplarla çevrimiçi oyunlar oynanması çevrimiçi bağımsızlığın kazanılmasına etki edebilmektedir[20].

Oyun süresindeki farklılıklarda, aşırı oyun kullanımı, yalnızlıktan kaçış ve çevrimiçi bağımsızlık düzeyleri arasında anlamlı bir farklılık görülmektedir. Çevrimiçi oyunları oynamanın günlük hayatın bir parçası haline geldiği ve özellikle çevrimiçi bağımsızlığı zayıf ve yalnız oyuncular yalnızlıktan kaçmak için oyundaki oyuncu topluluklarıyla aşırı oyun oynamaktadır. Ayrıca çevrimiçi bağımsızlığı yüksek olan oyuncuların da çevrimdışı sosyal sermayeleri sayesinde edindikleri gerçek yaşamdan arkadaşlarıyla birlikte, çevrimiçi bağımsızlığı düşük bir gruptan daha fazla çevrimiçi oyun oynadığı ve oyuna kendilerini daha fazla kaptırdıkları görülmüştür[20].

Her ne kadar günlük oyun süresine bağlı olarak sosyal yeterlilik düzeyinde anlamlı farklılık bulunamasa da aşırı çevrimiçi oyun kullanımı ve sosyal yeterlilik ölçeğinin iletişimi başlatma, kendini açma ve girişkenlik alt ölçeklerinde negatif korelasyon olduğu görülmektedir. Çevrimiçi oyunlar bir "oyun" olarak görülse de güçlü sosyal yönleriyle oyuncuların arkadaşlık kurdukları, topluluklar oluşturdukları ve çeşitli oyun içi görevleri gerçekleştirmek için birlikte çalıştıkları bir çevrimiçi iletişim aracı olarak da değerlendirilmektedir[5,6,8]. Çevrimiçi oyunların bu özelliği sebebiyle oyuncular gerek çevrimiçi gerek çevrimdışı yolla sosyalleşerek aşırı oyun kullanımı sergilemektedir. Kim ve Kim'in çalışmasında aşırı çevrimiçi oyun kullanımını etkileyen çevrimiçi ve çevrimdışı sosyalliği ölçmek üzere geliştirilen ölçüm aracı çevrimiçi video oyunları üzerinden bu ölçümü sağlamaktadır[20]. Ancak bu çalışmada kullanılan sosyal yeterlilik ölçeği gerçek yaşamdaki genel sosyalliği ölçmek üzere geliştirilmiş olup çevrimiçi oyun kullanımıyla ilgili madde içermemektedir. Buna yönelik bir ölçüm aracıyla ayrıca test edilmesinin daha spesifik sonuçlar sunacağı düşünülmektedir. Hepsinden öte oyunda geçirilen süre her zaman tatmin edici bir sosyalliğe sebebiyet de vermeyebilir. Burada önemli olan oyuncuların oyun içinde geçirdikleri süre değil, bulundukları sosyal ortamın niteliğidir[6].

Aşırı çevrimiçi oyun kullanımının yordanmasına yönelik çalışmalarda yalnızlık, yalnızlıktan kaçış ve çevrimiçi bağımsızlık düzeyinin aşırı oyun kullanımını yordadığı görülmüştür. Kim ve Kim'in çalışmasına göre çevrimiçi bağımsızlık düzeyi aşırı oyun kullanımını iki yönlü olarak etkilemektedir[20]. Bir taraftan çevrimiçi bağımsızlık düzeyleri düşük olan kişiler yalnızlıktan kaçmak için oyun içindeki diğer oyuncularla kolay bir şekilde etkileşime girip kendilerini oyuna kaptırmaktadırlar. Öte yandan çevrimiçi bağımsızlığı yüksek olan oyuncular da çevrimdışı sosyal sermayeleri sayesinde edindikleri gerçek yaşamdan arkadaşlarıyla daha fazla çevrimiçi oyun oynadığı ve oyuna kendilerini daha fazla kaptırdıkları belirtilse de aşırı çevrimiçi oyun kullanımının ergenlerin psikososyal iyi oluşlarına ve akran ağlarının gelişip korunmasına olumlu katkıda bulunduğunu belirtilmiştir[21]. Bu açıdan sosyal yeterlilik düzeyinin de aşırı çevrimiçi oyun kullanımını yordaması beklenmekteyse de bu çalışmada bu yönde bir sonuç elde edilmemiştir. Öte yandan yalnız ergenler için aşırı oyun kullanımı bir çıkış kapısı olarak görülebileceğinden zamanla aşırı oyun kullanımı sonucu kişilerin yalnızlıkları artarken yaşam memnuniyetlerinin düşüp, sosyal sorunların ortaya çıktığı da belirtilmektedir[22]. Araştırmada yaşam memnuniyeti ele alınmamış olsa da yalnızlıkla ilişkisi benzer doğrultuda elde edilmiştir. Bu bulgular doğrultusunda yalnızlık, yalnızlıktan kaçış ve çevrimiçi bağımsızlık aşırı oyun kullanımını yordamaktadır.

Sonuç, Sınırlılıklar ve Öneriler

Çalışmada, çevrimiçi oyun oynamaya ve bu oyunlarda edinilen benlik ve kimlikler, sosyal yeterlilik ve yalnızlık düzeylerine özgü ölçümlerin Türk kültürüne uyarlaması adına psikometrik özellikleri incelenmiş ve bu ölçümlerin ergenlik ve beliren yetişkinlik döneminde ülkemizde yapılacak araştırmalarda kullanılabilir nitelikte geçerli ve güvenilir olduğunu göstermiştir. Bu çalışma, ergenlerin çevrimiçi kimlik keşiflerini anlamada önemli bir katkı sağlamakta ve aşırı oyun kullanımının psikososyal etkilerini inceleyen araştırmalar için bir temel oluşturmaktadır.

Çalışma kapsamında her ne kadar çevrimiçi ölçümler ele alınmış olsa da buna yönelik verilerin sadece çevrimiçi ortamda toplanması bir yanlılık oluşturabileceği ve genellenebilirliğin düşük olacağı düşünülmektedir. Dolayısıyla, ileriki çalışmalarda ayrıca yüz yüze de verilerin toplanması konu hakkında daha detaylı bir bilgi sağlayacaktır. Ayrıca, katılımcılara oynadıkları oyun türleri sorulmuş olsa da oyun türlerine bağlı olarak bir sınıflandırma yapılamadığından bu farklılıklar ele alınamamıştır. Kadın katılımcıların sayısı oynadıkları oyun türleri sebebiyle erkek katılımcılara göre daha az olduğundan sadece erkek örneklemle çalışılmıştır. Ancak, her oyun türü oyunculara farklı şekillerde kimlik denemesi yapma olanağı sunmaktadır. MMORPG oyuncuları ideallerindeki kimliği içeren karakterler oluştururken kimi RPG oyunlarında oyuncudan hazır sunulan karakterin kimliğiyle bütünleşmesi istenir. Dolayısıyla, cinsiyet, farklı oyun türleri ve ideal benlik açısından da ele alınarak yapılan çalışmalar bu konuda daha derinlemesine bilgi sağlayacaktır. Ayrıca, araştırmada çevrimiçi oyunlara bağlı olarak çevrimiçi kimlik keşfi, aşırı oyun oynama ve sosyal yeterlilik düzeyleri arasındaki ilişkiler çalışılmıştır. Gelecekte hem çevrimiçi hem de çevrimdışı rol yapma oyunları oynayan iki farklı örneklemin çevrimiçi ve çevrimdışı sosyal yeterlilikleriyle ilişkisi daha detaylı incelenebilir.

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EKLER

Ek 1: Benlik Belirginliği Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Kendimle ilgili düşüncelerim sıklıkla birbiriyle çelişir.	0,693
2. Kendimle ilgili fikirlerim günden güne değişiklik gösterebilir.	0,681
3. Gerçekte nasıl bir insan olduğumu düşünerek çok zaman harcıyorum.	0,667
4. Bazen gerçekte göründüğüm kişi olmadığımı hissediyorum.	0,691
5. Geçmişte nasıl biri olduğumu düşündüğümde, gerçekte nasıl biri olduğumdan emin olamıyorum.	0,765
6. Bazen başkalarını kendimden daha iyi tanıdığımı düşünüyorum.	0,585
7. Kendimle ilgili düşüncelerim çok sık değişiyor gibi görünüyor.	0,846
8. Eğer kendi kişiliğimi tanıtmam istenseydi, tanımlamalarım bir günden diğerine farklılaşabilirdi.	0,752
9. İstesem bile, birisine gerçekten neye benzediğimi söyleyeceğimi sanmıyorum.	0,649
10. Genel olarak, kim olduğum ve ne olduğum konusunda net bir fikrim var.	0,591
11 Bazı şeyleri aklımdan çıkarmak genellikle benim için zor çünkü ne istediğimi gerçekten bilmiyorum.	0,682
Açıklanan Varyans	48,267
Açıklanan Toplam Varyans	48,267
Cronbach Alpha	0,89

Ek 2: Çevrimiçi Kimlik Keşfi Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Kendimi ifade etmenin farklı yollarını denemek için interneti kullanmayı severim.	0,685
2. Kişiliğimi internet ortamında yansıtabildiğime inanıyorum.	0,744
3. Kendimi çevrim içi ortamda daha iyi olarak gösterebiliyorum.	0,819
4. Kiminle çevrim içi olmak istediğimi söyleyebileceğimi hissediyorum.	0,639
5. Bazı şeyler vardır ki kendimi çevrim içi olarak çevrim dışı olduğumdan daha özgürce ifade edebiliyorum.	0,755
6. Çevrim içi olduğumda, başkalarının beni nasıl görmesini istiyorsam kendimi öyle sunabilirim.	0,494
Açıklanan Varyans	48,600
Açıklanan Toplam Varyans	48,600
Cronbach Alpha	0,77

Ek 3: Çevrimiçi Bağımsızlık Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Diğer oyuncuların tavsiyelerini körü körüne takip ederim	0,634
2. Diğer oyuncular ne söylerse başarılı bir şekilde yerine getiririm.	0,405
3. Diğer oyuncuların söylediklerini takip etmenin en iyi yol olduğunu düşünüyorum.	0,562
4. Online oyunu yalnız başıma oynamak benim için zordur.	0,541
5. Diğer oyunculara yardım ettiğimden çok onlardan yardım aldım.	0,640
6. Online oyun oynarken, karar veremiyorum.	0,667
7. Online bir oyunu kendi kararlarımla oynamak yerine diğer oyuncuların yardımını bekliyorum.	0,713
8. Diğer oyuncuların davranışlarından kolayca etkilenirim.	0,589
Açıklanan Varyans	36,031
Açıklanan Toplam Varyans	36,031
Cronbach Alpha	0,72

Ek 4: Aşırı Çevrim İçi Oyun Kullanımı Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Korkarım ki, çevrim içi oyunlar olmadan hayat sıkıcı, boş ve eğlencesiz olurdu.	0,591
2. Gecenin geç saatlerinde oynanan çevrim içi oyunlarından dolayı uykuyu kaybettim.	0,536
3. Kendim oynamasam bile çevrim içi oyun oynuyormuş gibi hissediyorum.	0,548
4. Çevrim içi oyun oynamak için harcadığım gerçek zamanı gizlemek için başkalarına yalan söylüyorum.	0,533
5. Çevrim içi oyun oynamak için harcadığım zaman miktarını azaltmaya çalışıyorum ama bunu yapamıyorum.	0,687
6. Çevrim dışı olduğumda depresif, huysuz veya gergin hissediyorum; ancak, bu duygular tekrar çevrim içi olduğumda geçiyor.	0,608
7. Aslen niyet ettiğimden daha uzun çevrim içi oyunlar oynuyorum.	0,709
8. Okulum veya meslek yaşamım, çevrim içi oyun oynamak için harcadığım zamandan dolayı zarar görüyor.	0,613
9. Başkaları ile dışarı çıkmak yerine, çevrim içi oyunlar oynamak için daha fazla zaman harcıyorum.	0,523
10. Yapmam gereken başka bir şeye başlamadan önce çevrim içi oyun oynamaya başlarım.	0,602
Açıklanan Varyans	35,776
Açıklanan Toplam Varyans	35,776
Cronbach Alpha	0,79

Ek 5: UCLA Yalnızlık Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Ne kadar sıklıkla çevrenizdeki insanlarla "uyum içinde" olduğunuzu hissediyorsunuz?	0,679
2. Ne sıklıkla arkadaşlıktan yoksun hissediyorsunuz?	0,754
3. Ne kadar sıklıkla başvurabileceğin kimse olmadığını düşünüyorsun?	0,726
4. Ne sıklıkla yalnız hissediyorsunuz?	0,772
5. Ne sıklıkla bir grup arkadaşın parçası hissediyorsunuz?	0,694
6. Etrafınızdaki insanlarla ne sıklıkla ortak noktanız olduğunu düşünüyorsunuz?	0,661
7. Artık kimseye yakın olmadığınızı ne sıklıkla hissediyorsunuz?	0,779
8. Ne sıklıkta sizin ilgi ve fikirlerin çevrenizdeki insanlar tarafından paylaşılmadığını hissediyorsunuz?	0,586

9. Ne sıklıkta dışa dönük ve arkadaşça hissediyorsunuz?	0,555
10. İnsanlara ne sıklıkla yakın hissediyorsun?	0,598
11. Ne sıklıkla dışarıda kalmış hissediyorsunuz?	0,724
12. Başkalarıyla olan ilişkinizin ne kadar sıklıkla anlamlı olmadığını düşünüyorsunuz?	0,566
13. Kimsenin sizi gerçekten iyi tanıyamadığını ne sıklıkla hissediyorsunuz?	0,656
14. Ne kadar sıklıkla diğerlerinden ayrı hissediyorsun?	0,749
15. İstediğin zaman arkadaş bulabileceğinizi ne sıklıkla hissediyorsunuz?	0,550
16. Seni gerçekten anlayan insanlar olduğunu ne sıklıkla hissediyorsunuz?	0,670
17. Ne sıklıkla utangaç hissediyorsunuz?	0,387
18. Etrafınızda insanlar olduğunu ama sizinle olmadıklarını ne sıklıkla hissediyorsunuz?	0,758
19. Ne sıklıkla konuşabileceğin insanlar olduğunu düşünüyorsun?	0,747
20. Ne sıklıkla danışabileceğin insanlar olduğunu düşünüyorsun?	0,708
Açıklanan Varyans	45,297
Açıklanan Toplam Varyans	45,297
Cronbach Alpha	0,93

Ek 6: Sosyal Yeterlilik Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1	2	3	4
1. Çok iyi tanımadığım biriyle konuşmaya başlamak	0,851			
2. Kendimi ilk kez biriyle tanıştırmak	0,907			
3. Yeni bir arkadaşlık kurmak	0,869			
4. Daha iyi tanımak istediğin birini aramak	0,620			
5. Birilerine bir araya gelip bir şeyler yapmayı teklif etmek	0,535			
6. Size yaşadığı bir sorunu anlatan birini dikkatle dinlemek		0,764		
7. Kendisini kötü hisseden birini rahatlatmak		0,876		
8. Birilerine kötü bir deneyim ile başa çıkmalarında yardımcı olmak	0.814			
9. Birisi senden yardım istediğinde, yardım etmek		0,712		
10. Birilerini rahatlatmak için yardımcı olmak		0,853		
11. Duygularını başka birine söylemek				0,749
12. Başkalarına utandığın şeylerden bahsetmek.				0,663
13. Birisine çekici veya etkileyici olduğunu söylemek.				0,786
14. Birisine ondan hoşlandığını söylemek				0,758
15. Hassas tarafını başkalarına göstermek				0,701
16. Biri size haksızlık ettiğinde haklarınızı savunmak.			-0,787	
17. Birisi seni aptal yerine koyduğunda kendini savunmak.			-0,854	
18. Biri seni yapmadığın bir şeyle suçladığında kendini savunmak.		-0,832		
Açıklanan Varyans	36,046	14,134	8,835	6,725
Açıklanan Toplam Varyans	36,046	51,180	60,015	66,74
Cronbach Alpha	0,86	0,87	0,81	0,86

Ek 7: Yalnızlıktan Kaçış Ölçeğinin Faktör Yapısı ve Faktör Yükleri

Maddeler	1
1. Yalnız kaldığımda yalnızlığı gidermek için çevrim içi oyunlar oynuyorum.	0,939
2. Konuşacak biri olmadığında, online oyun oynarım	0,932
3. Yalnızlıktan kurtulmak için online oyun oynuyorum	0,864
Açıklanan Varyans	83,216
Açıklanan Toplam Varyans	83,216
Cronbach Alpha	0,89

Predictive Factors Influencing Diagnostic Yield in Image-Guided Bone Biopsies: A Retrospective Analysis

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Abstract

Aim: To evaluate the factors that influence the diagnostic yield of image-guided percutaneous core needle biopsy (CNB) for bone lesions.

Method: A retrospective analysis was conducted on 211 patients who underwent 226 image-guided percutaneous core needle biopsies for bone lesions between June 2020 and June 2024. The variables evaluated included patient age, lesion location, the modality used for biopsy guidance (ultrasound vs. CT), and pre-biopsy imaging techniques (PET/CT, MRI).

Results: Diagnostic adequacy was achieved in 70.1% of cases. Key findings revealed that patients with adequate diagnostic yield were significantly older than those with inadequate yield (p=0.001). Lesions located in the lower extremity were more frequently associated with inadequate diagnostic yield (p=0.029), and the use of CT guidance was more common in this group (p<0.001). Additionally, pre-biopsy MRI use was higher in the inadequate yield group (p=0.005), while pre-biopsy PET scan use was lower (p=0.034). Among patients who underwent pre-biopsy PET scans, those with adequate diagnostic yield had significantly higher SUV values compared to those with inadequate yield (p=0.004)

Conclusion: This study highlights key factors influencing diagnostic yield in bone biopsies, providing insights that can guide clinical decision-making. Understanding these factors may help improve diagnostic yield, aiding in appropriate treatment planning for patients with bone lesions.

Keywords: Bone neoplasms, image-guided biopsy, computed tomography, ultrasonography.

Görüntüleme Eşliğinde Yapılan Kemik Biyopsilerinde Tanı Yeterliliğini Etkileyen Faktörler: Retrospektif Bir Analiz Çalışması

Öz

Amaç: Kemik lezyonları için görüntüleme eşliğinde yapılan perkütan kor iğne biyopsisinin tanı yeterliliğini etkileyen faktörleri değerlendirmek.

Yöntem: Haziran 2020 ile Haziran 2024 arasında kemik lezyonları için 226 görüntüleme eşliğinde perkütan kor iğne biyopsisi uygulanan 211 hasta retrospektif olarak değerlendirildi. Hasta yaşı, lezyon lokalizasyonu, biyopsi rehberliğinde kullanılan modalite (ultrason vs. BT) ve biyopsi öncesi görüntüleme yöntemleri (PET/CT, MRI) gibi çeşitli değişkenlerin biyopsi yeterliliği üzerindeki etkisi araştırıldı.

Bulgular: Olguların %70,1'inde (148/211) biyopsi sonucu tanısal açıdan yeterli bulundu. Daha ileri yaş grubunda tanısal yeterlilik oranı anlamlı olarak daha yüksek saptandı (p=0,001). Üst ekstremite ve aksiyal iskelet yerleşimli lezyonlarda tanısal yeterlilik daha yüksek bulundu. US rehberliğinde biyopsi yapılan olgularda, BT rehberliğine göre daha yüksek oranda yeterlilik sağlandı (p<0,001). Ayrıca, biyopsi öncesi MRI kullanımı yetersiz tanı gruplarında daha yüksekken (p=0,005), biyopsi öncesi PET/CT kullanımı daha düşük bulundu (p=0,034). Biyopsi öncesi PET/CT yapılan hastalarda, yeterli tanı sağlananların SUV değerlerinin, yetersiz tanı sağlananlara göre anlamlı derecede yüksek olduğu görüldü (p=0,004).

Sonuç: Çalışma, kemik biyopsilerinde tanı yeterliliğini etkileyen faktörleri ortaya koymakta ve klinik karar verme sürecinde yol gösterici olabilecek önemli bilgiler sunmaktadır. Bu faktörlerin anlaşılması, tanı yeterliliğini artırarak kemik lezyonları olan hastaların tedavi planlamasına katkıda bulunabilir.

Anahtar Sözcükler: Kemik neoplazmları, görüntüleme eşliğinde biyopsi, bilgisayarlı tomografi, ultrasonografi, iğne biyopsisi.

Introduction

Although advanced medical imaging techniques offer valuable insights for characterizing bone lesions, histopathological examination is often required for subsequent treatment planning[1]. While open surgical biopsies are considered the gold standard for obtaining tissue for diagnosis, image-guided percutaneous core needle biopsy has become the initial method of choice for diagnosing musculoskeletal lesions at many institutions. This preference is due to its less invasive nature, reduced sedation time, lower cost, shorter recovery time, and fewer complications[2]. Image-guided core needle biopsies are usually performed using ultrasound or CT guidance and have a high diagnostic accuracy, ranging from 66% to 98%[2-11].

The diagnostic yield of percutaneous image-guided bone biopsies is influenced by numerous factors. However, there are several studies that examine the predictive factors affecting the diagnostic yield of image-guided percutaneous core needle biopsy (CNB) for bone lesions[1,2,11-20].

This retrospective single-center study aimed to identify the factors influencing the diagnostic yield of image-guided percutaneous CNB for bone lesions by examining variables related to patient demographics, bone lesion characteristics, biopsy procedures, and imaging techniques.

Material and Methods

Ethics Approval

The study received approval from the Cam and Sakura City Hospital Ethics Committee (approval date: June 22, 2023, approval number: 2023-275).

Patient Cohort

Between June 2020 and June 2024, 225 patients referred for percutaneous image-guided biopsy of bone lesions were retrospectively evaluated. Fourteen patients with incomplete clinical data or inaccessible pre-procedure imaging were excluded, resulting in 211 patients with complete records, accessible pre-procedure imaging, and pathology results. Sixteen of these patients underwent two biopsies, bringing the total to 226 procedures evaluated. Biopsies were conducted on musculoskeletal lesions of uncertain origin or suspected malignancy, with decisions made collaboratively by orthopedic surgeons and radiologists based on clinical data and imaging findings.

Pre-Biopsy Evaluation

Each patient's biopsy indication, lesion location, and suitability for the procedure (including hemogram, coagulation profiles, and medication use) were assessed. Previous imaging studies (CT, MRI, PET) were reviewed. Informed consent was obtained from all patients, who were informed about the procedure and potential complications.

Modality Selection

The choice of imaging modality was based on lesion location, size, type, and cortical involvement. Ultrasound was preferred for lesions visible by this method; otherwise, CT guidance was used. The biopsy approach was decided jointly by the orthopedic surgeon and radiologist to ensure the biopsy tract could be excised during surgery to prevent recurrence. Radiography, CT, MRI, or PET CT was used to assess lesion spread and assist in planning. In cases with multiple lesions, the most accessible lesion was selected for biopsy.

Biopsy Procedure

Each biopsy was conducted by the same interventional radiologist with eight years of experience in image-guided biopsies.

CT-Guided Biopsy

CT-guided biopsies were performed under local anesthesia with a Tru-Cut needle (Geotek, Ankara, Turkey). Depending on the lesion, either an 11-gauge bone biopsy needle or a 14-gauge core biopsy needle was used. Patients were positioned to optimize access and comfort. A scanogram was obtained to identify the target, and after local anesthesia, the needle was inserted with CT confirmation (Figure 1,2). Specimens were sent to pathology in 10% formalin.

Ultrasound-Guided Biopsy

Ultrasound-guided biopsies were conducted using a linear or convex probe (Hitachi Arietta 65, Tokyo, Japan). Real-time sonographic guidance and color Doppler were used to position the needle, avoid vascular structures, and target viable tissue. After local anesthesia, the biopsy needle was introduced under continuous ultrasound monitoring. A single core was collected and preserved in formalin for histopathological examination.

Data Collection and Definitions

Patient data were retrospectively reviewed, including demographics, biopsy details (date, site, approach, number of cores, complications), histopathology reports, additional biopsy sessions for inconclusive results, and any subsequent surgeries or follow-ups. Pre-biopsy imaging data (CT, MRI, PET) were collected, focusing on lesion size, location, type (lytic, sclerotic, mixed), and SUV max on PET CT. Lesions were categorized as lytic (bone destruction), sclerotic (increased bone density), or mixed (containing both dense and lucent components), based on radiological appearance. Measurements were taken along the maximum long-axis diameter. A musculoskeletal radiologist, blinded to pathology results, assessed all imaging features.

Figure 1. A) A 45-year-old female patient with a history of breast cancer presents with a lytic lesion in the left iliac bone on CT imaging (indicated by a solid white arrow). B) A CT-guided core needle biopsy was performed (indicated by an open white arrow), confirming the diagnosis of breast cancer metastasis.
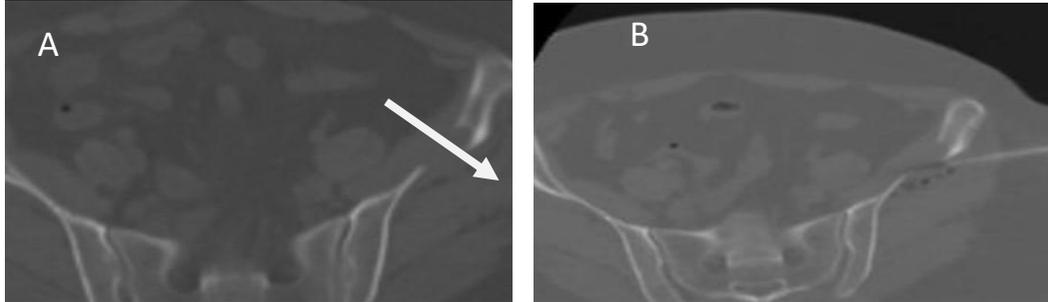
Figure 2. A) A 70-year-old male patient with a lytic lesion in the right pedicle of the L3 vertebral body, as indicated by the solid white arrow. B) CT-guided biopsy of the lesion confirmed a diagnosis of plasma cell neoplasm.
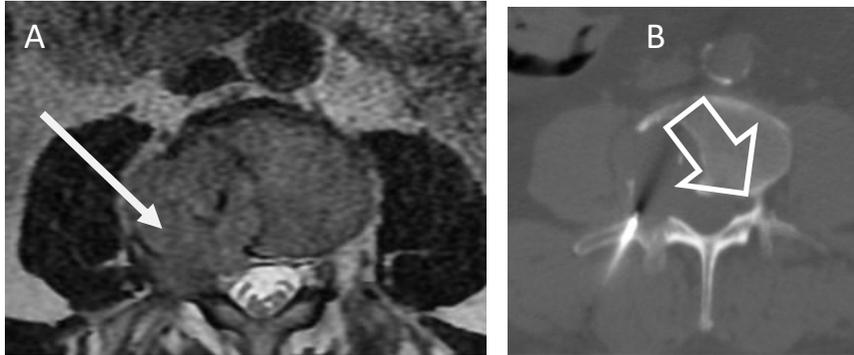
Diagnostic Yield Definition

Diagnostic yield was considered positive if the biopsy results matched post-surgical findings or provided a definitive pathological diagnosis consistent with stable imaging over six months. A negative yield was defined by discordance with post-surgical findings or insufficient specimen volume for diagnosis.

Statistical Analysis

Data analysis was performed using SPSS for Windows version 18.0 (SPSS Inc., Chicago, IL, USA). The normality of data distribution was assessed using the Shapiro-Wilk test. Numerical data were summarized with means, standard deviations, and medians, while categorical data were summarized with frequencies and percentages. The Mann-Whitney U test was used to analyze non-normally distributed numerical data, and chi-square tests were employed for categorical comparisons. Statistical significance was defined as $p < 0.05$.

Results

This retrospective study included 211 patients who underwent biopsies for suspected bone lesions. The median age was 53 years (range 35-63 years), with 50.2% (n=106) being female. Diagnostic adequacy was achieved in 148 patients (70.1%), while 63

patients (29.9%) had non-diagnostic biopsies. The most common diagnosis was metastasis, identified in 50 cases (33.8%). Detailed demographic and biopsy results are presented in Table 1.

Table 1. Patient demographics and disease characteristics

Characteristic	All Patients (n=211) n (%)
Diagnostic Adequacy	
Inadequate	63 (29.9)
Adequate	148 (70.1)
Diagnosis (n=148)	
Plasma Cell Neoplasm	21 (14.2)
Metastasis	50 (33.8)
Soft Tissue Sarcoma	31 (20.9)
Chondroma	5 (3.4)
Lymphoma	8 (5.4)
Ewing Sarcoma	4 (2.7)
Rhabdomyosarcoma	1 (0.7)
Giant Cell Tumor	2 (1.4)
Paget's Disease	2 (1.4)
Fibrous Dysplasia	5 (3.4)
Langerhans Cell Histiocytosis	2 (1.4)
Hemangioma	2 (1.4)
Rosai-Dorfman Disease	1 (0.7)
Pseudogout	1 (0.7)
Chondrosarcoma	2 (1.4)
Foreign Body Granuloma	1 (0.7)
Aneurysmal Bone Cyst	1 (0.7)
Osteosarcoma	2 (1.4)
Osteoblastoma	2 (1.4)
Myositis Ossificans	1 (0.7)
Sarcoidosis	1 (0.7)
Ganglion Cyst	1 (0.7)
Pleomorphic Sarcoma	1 (0.7)
Plasmacytoma	1 (0.7)

Among the 63 non-diagnostic cases, the reasons for non-diagnosis included necrosis in 27 cases, fragments of reactive bone tissue in 11 cases, and insufficient tissue for diagnosis in 25 cases. Of the 148 diagnostic biopsy cases, 12 were followed by surgical resection. In 11 of these cases (91.6%), the biopsy diagnosis matched the final surgical

findings. However, one case initially diagnosed as osteosarcoma via biopsy was later identified as chondrosarcoma after surgical resection.

In 4 of the 63 non-diagnostic cases, the final diagnosis was confirmed through surgery, which revealed one case of plasma cell neoplasm, one case of osteosarcoma, and two cases of diffuse B-cell lymphoma. A total of 16 cases required repeat biopsy due to non-diagnostic results from the first biopsy. Among these repeat biopsies, 7 yielded a definitive diagnosis: three cases of carcinoma metastasis, two cases of plasma cell neoplasm, and two cases of osteosarcoma.

Lesion characteristics included: location in the lower extremity (n=125, 59.2%), CT-guided biopsy (n=160, 75.8%), lytic lesion type (n=140, 66.4%), a mean lesion long axis of 35.0 mm, and the use of an 11G needle gauge (n=131, 62.1%). Additionally, 48 patients (22.7%) had a pre-biopsy diagnosis of malignancy (Table 2).

Statistical analysis identified several predictors of diagnostic yield. Patients with adequate diagnostic yield were significantly older than those with inadequate yield (p=0.001). Biopsies in the lower extremity were more commonly associated with inadequate yield (p=0.029), and CT guidance was more prevalent in this group (p<0.001). Pre-biopsy MRI use was higher, while pre-biopsy PET scan use was lower in the inadequate yield group (p=0.005 and p=0.034, respectively). Additionally, among patients who underwent PET scans, those with adequate diagnostic yield had higher SUV values compared to those with inadequate yield (p=0.004) (Table 2).

Table 2. Comparison of Patient Demographics and Diagnostic Method Characteristics with Diagnostic Adequacy

Characteristic	All Patients (n=211)	Diagnostic Adequacy		p
		Inadequate (n=63)	Adequate (n=148)	
Age / Median (1st-3rd Quartile)	53.0 (35.0-63.0)	42.0 (26.0-56.0)	56.0 (39.2-65.0)	**0.001**[a]
Gender, n (%)				
Female	106 (50.2)	35 (55.6)	71 (48.0)	0.313[b]
Male	105 (49.8)	28 (44.4)	77 (52.0)	
Second biopsy, n (%)				
No	195 (92.4)	54 (85.7)	141 (95.3)	**0.020**[b]
Yes	16 (7.6)	9 (14.3)	7 (4.7)	
Lesion location, n (%)				
Upper extremity	16 (7.6)	3 (4.8)	13 (8.8)	**0.029**[b]
Lower extremity	125 (59.2)	46 (73.0)	79 (53.4)	
Axial	70 (33.2)	14 (22.2)	56 (37.8)	
Imaging guidance method, n (%)				
USG	51 (24.2)	4 (6.3)	47 (31.8)	**<0.001**[b]
CT	160 (75.8)	59 (93.7)	101 (68.2)	
Lesion characteristics, n (%)				
Lytic	140 (66.4)	38 (60.3)	102 (68.9)	0.481[b]
Sclerotic	37 (17.5)	13 (20.6)	24 (16.2)	

Mixed type	34 (16.1)	12 (19.0)	22 (14.9)	
Lesion long axis (mm) **Median (1st-3rd Quartile)**	35.0 (22.0-54.0)	40.8 (21.0-55.0)	42.1 (22.0-54.0)	0.815[a]
Prebiyopsi, n (%)				
CT	112 (53.1)	30 (47.6)	82 (55.4)	0.300[b]
MRI	134 (63.5)	49 (77.8)	85 (57.4)	**0.005[b]**
PET/CT	69 (32.7)	14 (22.2)	55 (37.2)	**0.034[b]**
PET SUV max (n=68) **Median (1st-3rd Quartile)**	5.7 (3.5-10.3)	3.5 (1.4-5.7)	6.4 (4.5-10.5)	**0.004[a]**
Needle gauge, n (%)				
11 G	131 (62.1)	48 (76.2)	83 (56.1)	-
13 G	28 (13.3)	10 (15.9)	18 (12.2)	
14 G	23 (10.9)	-	23 (15.5)	
16 G	25 (11.8)	5 (7.9)	20 (13.5)	
18 G	4 (1.9)	-	4 (2.7)	
Previous known malignancy, n (%)				
No	163 (77.3)	54 (85.7)	109 (73.6)	0.056[b]
Yes	48 (22.7)	9 (14.3)	39 (26.4)	
Surgical definitive diagnosis, n (%)				
No	195 (92.4)	59 (93.7)	136 (91.9)	0.451[b]
Yes	16 (.,6)	4 (6.3)	12 (8.1)	

[a]Mann-Whitney U test; [b]Chi- square test

Using the Society of Interventional Radiology Complication Classification System, no major complications were reported. Minor complications included hematomas at the entry site in two patients, which resolved spontaneously.

Discussion

In our retrospective study of 211 patients who underwent image-guided bone biopsies, we achieved a diagnostic adequacy rate of 70.1%. This result aligns well with previously reported diagnostic adequacy rates in the literature, which range from 66% to 98%[1,2,14]. This study identified several key factors associated with a higher likelihood of obtaining sufficient diagnostic information, including older age, the use of ultrasound for biopsy guidance, the presence of pre-biopsy PET/CT, higher SUV values, and lesions located in the upper extremity and axial skeleton.

Despite advancements in imaging techniques, accurately diagnosing bone lesions remains challenging. The primary clinical concern is differentiating between benign and malignant lesions, which directly impacts treatment decisions. PET/CT is particularly effective in identifying metabolically active regions, while MRI provides high-resolution visualization of both bone and soft tissue. Recent improvements in MRI technology have enhanced its role as a radiation-free alternative in select cases. Though unlikely to replace CT in emergency settings, MRI's expanding applications in diagnosis, treatment planning, and surgical guidance offer new possibilities for optimizing biopsy strategies.

However, despite these advances, imaging alone often falls short of providing a definitive diagnosis, necessitating histopathological confirmation through biopsy[1,11,14,15].

Image-guided biopsy has become an indispensable tool in the diagnosis of bone lesions due to its minimally invasive nature, cost-effectiveness, and low complication rates. The diagnostic adequacy observed in our study (70.1%) aligns with previous findings, further reinforcing the reliability of this approach in clinical practice[1,2,14,21]. While percutaneous image-guided biopsy is the preferred method, other techniques such as fluoroscopic, MRI-guided, or open biopsy may be necessary in specific cases. Fluoroscopic-guided biopsy is primarily used for spinal lesions but has limited soft tissue resolution, making it less effective for heterogeneous bone lesions[22]. Open biopsy is sometimes required when percutaneous sampling fails, offering a diagnostic accuracy of 91%-96%, albeit at the cost of increased morbidity. Complications such as seroma, hematoma, infection, wound dehiscence with tumor fungation, and fractures occur more frequently after open or excisional biopsies. In contrast, percutaneous biopsy techniques have a significantly lower complication rate (0%-1%), whereas open surgical biopsies report higher rates, ranging from 4% to 19%[23,24]. MRI-guided biopsy is an alternative when CT fails to provide adequate visualization, offering superior accuracy but at a higher cost[25].

This study found that older age was significantly associated with a higher diagnostic yield in bone biopsies. Previous research has indicated that older patients are more likely to have malignant bone lesions, which typically yield better diagnostic results compared to benign lesions[4,9,17]. However, there is limited data directly correlating older age with improved diagnostic outcomes in bone lesions. This association may be due to age-related changes in bone density and composition, which could make lesions more distinct on imaging, thereby enhancing biopsy accuracy. Alternatively, the increased prevalence of malignancy in older patients may inherently result in a higher diagnostic yield[4,9]. These hypotheses underscore the need for further studies to explore the mechanisms by which age influences diagnostic success in bone biopsies.

Ultrasound guidance was identified as an effective predictor of diagnostic yield in our study and is the preferred method for musculoskeletal biopsies in our clinic, particularly for lesions visible on ultrasound, such as those with cortical thinning or destruction and extraosseous soft tissue involvement. The benefits of ultrasound—real-time imaging, absence of ionizing radiation, lower cost, and effectiveness in visualizing soft tissues—contribute to its higher diagnostic success[16,26]. In contrast, CT guidance was more often associated with inadequate yield, likely due to its use in deeper, less accessible lesions. Ultrasound is particularly useful for lytic bone lesions with cortical disruption, especially in the extremities or pelvis with soft tissue components, making it an excellent choice in these cases[26]. However, CT remains essential and most commonly used for biopsies of deep or non-cortical destruction lesions where ultrasound is not feasible[27].

This study also demonstrated that pre-biopsy imaging is a significant predictor of diagnostic yield. The presence of pre-biopsy PET/CT, particularly with higher SUV values, was associated with a higher diagnostic yield. PET/CT is highly effective in identifying metabolically active lesions, which allows for the targeting of the most suitable biopsy sites. It can also reveal occult lesions, highlight necrotic or inhomogeneous areas, and, in cases with multiple lesions, identify the most

metabolically active lesion, ensuring that the biopsy is taken from the area most likely to yield diagnostic information[28]. This targeted approach increases the likelihood of obtaining a diagnostic sample.

Lesion location was another significant factor in diagnostic yield, with higher success rates observed in upper extremity and axial skeleton lesions. This may be due to the accessibility and distinct pathological features of lesions in these areas, which often lead to better imaging and biopsy outcomes. Studies have shown that diagnostic yield is generally higher in axial lesions compared to appendicular ones, likely because axial bone pathology tends to be more aggressive or advanced at diagnosis[27]. These anatomical and pathological differences between axial and appendicular regions likely account for the observed disparities in diagnostic yields.

Studies findings highlight the importance of carefully considering patient demographics, lesion characteristics, and imaging modalities when planning bone biopsies. By aligning the biopsy approach with these factors, diagnostic yield can be enhanced, the need for repeat procedures reduced, and patient outcomes ultimately improved.

Despite the valuable insights gained from this study, there are some limitations to consider. First, the retrospective nature of the study introduces the potential for selection bias. Second, the single-center and single-operator design may limit the generalizability of the findings. Third, not all patients had surgical pathology results or follow-up data, which could affect the accuracy of the conclusions. To address these limitations, future prospective studies with larger, multicenter cohorts could provide more robust and generalizable data, helping to refine predictive models for diagnostic yield in bone biopsies. Additionally, exploring newer imaging techniques, such as MRI-guided biopsies or fusion imaging, could further improve diagnostic outcomes and should be a focus of future research.

Conclusion

In conclusion, this study highlights the complexity of achieving optimal diagnostic yield in bone biopsies and identifies key predictive factors that can guide clinical decision-making. By understanding these factors, clinicians can enhance the likelihood of obtaining sufficient diagnostic information, which in turn facilitates accurate diagnosis and appropriate treatment planning for patients with bone lesions.

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Antiseptik Solüsyonların *Myroides Spp.*'ye Karşı Etkinliğinin İn Vitro İncelenmesi

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Öz

Amaç: *Myroides spp.* karbapenemler dahil beta-laktam antibiyotiklere karşı oldukça dirençli, aminoglikozitlere, florokinolonlara ve sülfametoksazole karşı ise değişken duyarlılık gösteren mikroorganizmalardır. Bu çalışmada çeşitli antiseptik maddelerin idrar kültüründen izole edilen *Myroides odoratus/odoratimimus* izolatı üzerine *in vitro* etkinliğinin incelenmesi amaçlandı.

Yöntem: İn vitro çalışmada, amikasin, seftazidim, siprofloksasin, imipenem, levofloksasin, piperasilin tazobaktam, tobramisine dirençli olduğu bilinen *Myroides odoratus/odoratimimus* klinik izolatı kullanıldı. Bu izolat %5 koyun kanlı agarda 24 saatlik inkübasyon sonunda üreyen bakteri kolonilerinden Mueller Hinton Broth ile 0.5 McFarland olmak üzere bakteri süspansiyonu hazırlandı. Sonrasında izolat, kalitatif süspansiyon yöntemine göre; hipokloröz asit (HOCL), povidon-iyot, klorheksidin ve alkol bazlı el dezenfektanı ile üç, beş, 10, 15, 20, 30 saniyelik sürelerle temas ettirildi. Temas süresi 990 µl dezenfektanın içerisine, vortekslenen 10 µl bakteri süspansiyonu ilave edilerek başlatıldı. Temas süreleri sonunda 10 µl alınarak, %5 koyun kanlı agara ekim gerçekleştirilip 24 saat inkübasyon süresi sonunda bakteri üremesi olup olmadığı değerlendirildi. Kontrol amacı ile 990 µl Mueller Hinton Broth'a 10 µl bakteri süspansiyonu ilave edilip %5 koyun kanlı agara ekimi yapıldı.

Bulgular: Çalışmada povidon-iyot (%2)'un denenen klinik izolat üzerinde bekletilen tüm sürelerde en etkili antiseptik olduğu tespit edildi. Üç saniyelik temas sonucunda üremeyi baskıladığı görüldü. Klorheksidin (%0.2) ve alkol bazlı dezenfektan (%70 etil alkol) için beş saniyelik temasın yeterli olduğu tespit edildi. HOCL'nin etkili olması için ise en az 15 saniye temas süresi gerektiği saptandı. Etkinliği en yüksek ajanın %2 povidon-iyot olduğu saptandı. HOCL'nin de etkinliğinin olduğu ancak daha uzun süre maruziyet gerektirdiği saptandı.

Sonuç: Çalışmada üriner sistem enfeksiyonu (ÜSE) tedavisinde lokal olarak mesane irrigasyonu ile kullanılabilecek üç antiseptik solüsyonun üçünün de *M. odoratus/odoratimimus*'a karşı etkin olduğu görülmüştür. Etkinliği en yüksek ajanın %2 povidon-iyot olduğu gösterilmiştir.

Anahtar sözcükler: Alkol bazlı dezenfektan, hipokloröz asit*, Myroides spp.,* povidon-iyot.

In Vitro Evaluation of the Efficacy of Antiseptic Solutions against *Myroides spp.*

Abstract

Aim: *Myroides spp.* are microorganisms that exhibit high resistance to beta-lactam antibiotics, including carbapenems, while displaying variable susceptibility to aminoglycosides, fluoroquinolones, and

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sulfamethoxazole. This study aimed to investigate the *in vitro* efficacy of various antiseptic agents against *Myroides odoratus/odoratimimus* isolates isolated from urine cultures.

Method: In this in vitro study, a clinical isolate of *Myroides odoratus/odoratimimus* known to be resistant to amikacin, ceftazidime, ciprofloxacin, imipenem, levofloxacin, piperacillin/tazobactam, and tobramycin was used. The isolate was grown on sheep blood agar (5% SBA) and incubated for 24 hours, followed by the preparation of a bacterial suspension in Mueller Hinton Broth (5 mL, 0.5 McFarland). Subsequently, the isolate was exposed to hypochlorous acid (HOCl), povidone-iodine, chlorhexidine, and alcohol-based hand sanitizer using contact times of 3, 5, 10, 15, 20, and 30 seconds, according to the qualitative suspension method. The contact time was initiated by adding 10 μl of bacterial suspension to 990 μl of the disinfectant. After the contact time, 10 μl was collected, inoculated onto 5% sheep blood agar, and evaluated for bacterial growth after a 24-hour incubation period. As a control, 10 μl of the bacterial suspension was added to 990 μl of Mueller Hinton Broth and plated on sheep blood agar.

Results: In this study, povidone-iodine (2%) was found to be the most effective antiseptic against the tested clinical isolate, suppressing growth after a 3-second contact time. A 5-second contact time was sufficient for chlorhexidine (0.2%) and alcohol-based disinfectant (70% ethyl alcohol). HOCl required a minimum contact time of 15 seconds for effective activity. The highest efficacy was observed with 2% povidone-iodine. Although HOCl was also effective, it required longer exposure times.

Conclusion: In this study, it has been observed that three antiseptic solutions, which can be used locally for bladder irrigation in the treatment of urinary tract infections, are effective against *M. odoratus/odoratimimus*. It has been demonstrated that the most effective agent is 2% povidone-iodine.

Keywords: Alcohol-based sanitizer, hypochlorous acid, *Myroides spp.,* povidone-iodine.

Giriş

Flavobacteriaceae ailesine ait olan *Myroides* türleri (*spp*.) içerisinde en sık insanlardan izole edilenler *Myroides odoratimimus* ve *Myroides odoratus* türleridir[1]. Hareketsiz, spor oluşturmayan Gram negatif basil özelliği gösterirler. Standart besiyerlerinin çoğunda üreyebilen bu mikroorganizmalar MacConkey agarda da üreyebilmektedir. Koloniler besiyerinde sarı pigment yapmakta ve meyve benzeri kokuya neden olmaktadır. Oksidaz, katalaz, üreaz ve jelatinaz testleri pozitiftir, nitriti indirgeyebilirler[2]. *Myroides spp*. toprakta ve sularda yaygın olarak bulunmakta olup kültürde ürediklerinde genellikle klinik önemi olmayan kontaminantlar olarak değerlendirilmektedirler. Yine de nadiren üriner sistem enfeksiyonu (ÜSE), endokardit, ventrikülit, deri ve yumuşak doku enfeksiyonu, pnömoni, bakteriyemi, septik şok gibi tablolarda enfeksiyon etkeni olabileceği bildirilmiştir. Bu bildirimlerdeki hastalar genellikle ciddi immünsüpresyonu olan hastalardır; ancak nadiren normal konakta da hastalık yapabileceği bildirilmiştir[3].

Myroides spp. karbapenemler dahil beta-laktam antibiyotiklere karşı oldukça dirençlidir, aminoglikozitlere, florokinolonlara ve sülfametoksazole karşı ise değişken duyarlılık paternleri göstermektedir[4]. Bakterinin antibiyotiklere karşı yüksek oranda direnci tedavide güçlüklere yol açmaktadır. Mikroorganizma ile etkin bir şekilde mücadele edilebilmesi için özellikle ÜSE ve yara enfeksiyonları gibi lokal antimikrobiyal tedavilerin yapılabildiği tablolarda antiseptik solüsyonların kullanımı gündeme gelmektedir. Bu çalışmada alkol bazlı dezenfektan ve intravezikal yıkamada kullanılabilen üç adet antiseptik maddenin idrar kültüründen izole edilen *Myroides odoratus/odoratimimus* izolatı üzerine *in vitro* etkinliğinin incelenmesi amaçlanmıştır.

Gereç ve Yöntem

Myroides odoratus/odoratimimus klinik izolatı XXX Hastanesi Tıbbi Mikrobiyoloji Laboratuvarı'nda izole edildi ve çalışma burada yürütüldü. Klinik bakteri izolatı amikasin, seftazidim, siprofloksasin, imipenem, levofloksasin, piperasilin tazobaktam, tobramisine dirençli idi. Antiseptik ve dezenfektanlardan intravezikal yıkamada kullanılabilen Crystalin [hipokloröz asit (HOCL), NHP İlaç, Türkiye], Poviderm [povidon-iyot (%10), Biorad, Türkiye], klorheksidin (%0.2, Detrox, Türkiye) ve alkol bazlı el dezenfektanı (%70 etil alkol, Ficomed, Türkiye) çalışmaya alındı. %10'luk povidon-iyot solüsyonu çalışmada beş kat sulandırılarak intravezikal uygulamada kullanım için önerilen konsantrasyonu ile değerlendirildi. HOCL, klorheksidin ve alkol bazlı el dezenfektanı ise sulandırılmadan kullanıldı.

%5 koyun kanlı agarda (RTA, Türkiye) üreyen izolatın koloni morfolojisi, kokusu, oksidaz pozitif Gram negatif basil olması ile ön planda *Myroides spp.* düşünülmüş olup BD Phoenix otomatize sisteminde (BD Diagnostics, ABD) NMIC/ID paneli ile bakteri identifikasyonu *Myroides odoratus/odoratimimus* olarak sağlandı. Bu panel sonucu tür ayrımı yapmamaktadır. Tür düzeyinde identifikasyon yapılamadı. Sadece tek bir suş üzerindeki etkinlikler belirlendi. Kontrol suşu olarak standart suş (ATCC) kullanılmadı. *Myroides odoratus/odoratimimus* klinik izolatının, koyun kanlı agarda 24 saatlik inkübasyon sonunda üreyen bakteri kolonilerinden Mueller Hinton Broth (RTA, Türkiye) ile 0.5 McFarland olmak üzere bakteri süspansiyonu hazırlandı. Sonrasında izolat, kalitatif süspansiyon yöntemine göre; HOCL, povidon-iyot, klorheksidin ve alkol bazlı el dezenfektanı ile üç, beş, 10, 15, 20, 30 saniyelik sürelerle temas ettirildi. Temas süresi 990 µl dezenfektanın içerisine, vortekslenen 10 µl bakteri süspansiyonu ilave edilerek başlatıldı. Temas süreleri sonunda 10 µl alınarak, %5 koyun kanlı agara ekim gerçekleştirilip 24 saat inkübasyon süresi sonunda bakteri üremesi olup olmadığı değerlendirildi. Kontrol amacı ile 990 µl Mueller Hinton Broth'a 10 µl bakteri süspansiyonu ilave edilip koyun kanlı agara ekimi yapıldı. 24 saat inkübasyon sonunda bakteri üremesi olduğu gözlendi[5,6].

Bulgular

Myroides odoratus/odoratimimus izolatının antiseptik solüsyon maruziyetine göre üreme durumu Tablo 1'de özetlendi. Çalışmada povidon-iyot (%2)'un denenen klinik izolat üzerinde bekletilen tüm sürelerde en etkili antiseptik olduğu tespit edildi. Üç saniyelik temas sonucunda üremeyi baskıladığı görüldü. Klorheksidin (%0.2) ve alkol bazlı dezenfektan (%70 etil alkol) için beş saniyelik temasın yeterli olduğu tespit edildi. HOCL'nin etkili olması için ise en az 15 saniye temas süresi gerektiği saptandı.

Tablo 1. Değişen sürelerde antiseptiklere maruz bırakılan *Myroides odoratus/odoratimimus* izolatının üreme durumu

Antiseptikler	Temas Süreleri					
	3 saniye	5 saniye	10 saniye	15 saniye	20 saniye	30 saniye
Hipokloröz Asit	+	+	+	-	-	-
%2 Povidon İyot	-	-	-	-	-	-
%0.2 Klorheksidin	+	-	-	-	-	-
Alkol Bazlı Dezenfektan (%70 Etil Alkol)	+	-	-	-	-	-

Tartışma

Antibiyotikler; hücre zarı üzerine, hücre duvarı sentezi, protein sentezi ve nükleik asit sentezi gibi fonksiyonlar üzerine tek bir yolak üzerinden etki ederek antimikrobiyal etki yapmaktadır. Antiseptikler ise aynı anda birden fazla yapı ve fonksiyon üzerinde inhibisyon yapmakta ve antimikrobiyal etki yaratmaktadır. Bu nedenle antiseptiklerin etkinliği antibiyotiklere kıyasla daha yüksek olmakta ve antimikrobiyal direnç gelişimi daha güç olmaktadır[7]. Bu durum *M. odoratus/odoratimimus* gibi antibiyotiklerin büyük çoğunluğuna dirençli mikroorganizmalara bağlı görülen ÜSE gibi lokal antimikrobiyal tedavilerin yapılabildiği tablolarda antiseptik solüsyonların kullanımını gündeme getirmektedir. Bu bağlamda çalışmada antiseptiklerin *M. odoratus/odoratimimus* izolatı üzerine *in vitro* etkinliğinin incelenmesi amaçlandı. Çalışmaya dahil edilen dört antiseptiğin tamamı *M. odoratus/odoratimimus*'a karşı etkin bulundu. Literatürde ulaşılabildiği kadarıyla povidon-iyot, klorheksidin ve alkol bazlı dezenfektanın *M. odoratus/odoratimimus* izolatı üzerine etkinliğinin araştırıldığı bir çalışma görülmemiş olup bu çalışma bu açıdan ilk olma özelliğine sahiptir.

Tuzlu suyun elektrolizi sonucu elde edilen, süperokside su olarak da adlandırılan HOCL günümüzde özellikle yara bakımında antimikrobiyal kontrol amacıyla kullanılmaktadır[8,9]. Günaydın ve ark.[10] tarafınca yapılan bir çalışmada HOCL; 1/1, 1/2, 1/5, 1/10, 1/50, 1/100 oranlarında sulandırılmış ve her bir konstantrasyon için *Myroides spp.* HOCL'ye bir, iki, beş, 10 ve 30 dakika maruz bırakılmış, sonrasında üremeler değerlendirilmiştir. HOCL 1/1 konsantrasyonunda tüm maruziyet sürelerinde *Myroides spp.*'ye karşı etkin bulunmuştur. Çalışmada kullanılan antiseptik solüsyonlar, esas olarak ÜSE tedavisinde mesane yıkamasında başka mikroorganizmalar için daha önce denenmiş ve kullanımında minimal yan etki görülmüş konsantrasyonlarda kullanıldı. Literatürde HOCL için mesane yıkamasının etkinliğinin değerlendirildiği bir çalışma olmadığı için bu çalışmada sulandırma yapılmadı ve 1/1 konstantrasyon kullanıldı. Çalışmada da Günaydın ve ark.[10] tarafınca yapılan çalışmaya benzer şekilde HOCL *M. odoratus/ odoratimimus* izolatına karşı etkin bulundu. Bu çalışmadan farklı olarak bu çalışmada *M. odoratus/ odoratimimus* HOCL'ye 30 saniye ve daha kısa sürelerde maruz bırakıldı, 15 saniyeden daha kısa süre antiseptik maruziyetinde antimikrobiyal etkinlik görülmedi.

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Moussa ve ark.[11] tarafınca yapılan bir çalışmada nörojenik mesanesi olan 119 hastaya günlük 50 cc %2 povidon-iyot ile mesane irrigasyonu yapılmış, solüsyon mesanede 10 dakika bekletilmiş ve boşaltılmış, bir yıllık takipte semptomatik ÜSE sıklığı %99,2 azalmıştır (p<0,001). Hastaların %65,6'sında herhangi bir yan etki görülmemiş, %26,8'inde hafif irritatif semptomlar oluşmuş, %5,9'unda genital bölgede kaşıntı oluşmuş, %1,7 sinde ise hematüri gelişmiştir. Aylık serum TSH ve iyot takiplerinde ise anormallik saptanmamıştır. Bu çalışmada da %2 povidon-iyot kullanılmış olup üç saniyelik maruziyette dahi *M. odoratus/odoratimimus* izolatının üremesini baskılayarak çalışmaya dahil edilen antiseptik solüsyonlar arasında en etkili ajan olduğu görüldü.

Wikström ve ark.[12] tarafınca yürütülen çok merkezli bir çalışmada idrar kültür üremesi olan spinal kord hasarlı 19 hastaya günde iki kere yedi gün boyunca 120 cc %0.2 klorheksidin solüsyonu ile mesane irrigasyonu yapılmış, solüsyon mesanede 15 dakika bekletilmiş ve boşaltılmış, takipte bakteriüri sıklığı %74 azalmıştır (p<0,005). Hastaların %71,4'ünde yan etki görülmemiş, altı hastada idrar kaçağı, mesanede kramp hissi, ishal görülmüş ve ek olarak bir hastada işlem sonrası semptomatik ÜSE görülmüştür. Bu çalışmada da %0,2 klorheksidin kullanılmış olup beş saniyelik maruziyette *M. odoratus/odoratimimus* izolatının üremesinin baskılandığı görüldü.

Enfeksiyon kontrolünün en önemli basamaklarından biri olan el hijyeninin hastane enfeksiyonlarının sıklığını azalttığı bilinmektedir[13]. El hijyeninde normal sabun ve su, antimikrobiyal sabun, antiseptik solüsyonlar gibi birçok farklı ürün kullanılmakta olup bunlardan en etkilisinin antiseptik solüsyonlar olduğu bildirilmiştir[14]. %60-90 oranında alkol içeren el antiseptikleri de bu amaçla etkin bir şekilde kullanılmaktadır[15]. Alkol bazlı el antiseptikleri ve el hijyeninde kullanılan antiseptik solüsyonların spor oluşturan mikroorganizmalara karşı etkinliğinin olmaması bir sorun olarak karşımıza çıkmaktadır[16]. *Myroides spp.* spor oluşturmadığı için alkol bazlı dezenfektanın *M. odoratus/ odoratimimus* izolatına karşı etkin olacağı öngörülmüştür ve çalışmaya dahil edilmiştir. Tahmin edildiği üzere çalışmada %70 etil alkol içeren dezenfektanın beş saniyelik maruziyet ile *M. odoratus/odoratimimus* izolatının üremesini baskıladığı görüldü.

Antibiyotik direnci, küresel düzeyde hızla artmakta ve ciddi bir halk sağlığı tehdidi oluşturmaktadır. Gerekli önlemlerin alınmaması durumunda, antibiyotik direncinin giderek artmasıyla birlikte, 2050 yılına gelindiğinde direkt antibiyotik direncine bağlı ölümlerin 1,91 milyona, antibiyotik direnci ile ilişkili ölümlerin ise 8,22 milyona ulaşması öngörülmektedir[17]. Bu bağlamda, patojen mikroorganizmalarla mücadelede antiseptik solüsyonların kullanımı gibi antibiyotik dışı uygulamaların, antibiyotik direncine bağlı ölümlerin azaltılmasında ve enfeksiyonların önlenmesinde hayati bir rol oynayabileceği düşünülmektedir. Bu yaklaşımlar, direnç nedeniyle antibiyotik tedavi seçeneği kalmayan hastalarda klinik tedaviye fayda sağlayabileceği gibi, dirençli mikroorganizmaların eliminasyonu sayesinde topluma yayılmayı kısıtlayarak halk sağlığına da katkı sağlayabilecektir.

El hijyeni, sağlık hizmeti ilişkili enfeksiyonları azaltmada en etkili yöntemdir[18,19]. El dezenfeksiyonuna uygun antiseptik solüsyonların kullanımıyla, *Myroides spp.* gibi

dirençli mikroorganizmaların hastadan hastaya çapraz bulaşı azalacak ve sağlık hizmeti ilişkili enfeksiyonların önlenmesi için önemli bir yol kat edilmiş olacaktır.

Bu çalışma insan çalışması veya hayvan deneyi olmadığı için (*in vitro* çalışma) etik kurul onayı gerektirmemektedir. Yazarlar bu makale ile ilgili herhangi bir çıkar çatışması bildirmemişlerdir.

Sonuç

Çalışmada ÜSE tedavisinde lokal olarak mesane irrigasyonu ile kullanılabilecek üç antiseptik solüsyonun üçünün de *M. odoratus/odoratimimus*'a karşı etkin olduğu görülmüştür. Etkinliği en yüksek ajanın %2 povidon-iyot olduğu gösterilmiştir. HOCL'nin de etkinliğinin olduğu ancak etkin olması için daha uzun süre maruziyet gerektirdiği görülmüştür, bu yüzden *M. odoratus/odoratimimus*'a bağlı gelişen ÜSE tedavisinde mesane irrigasyonu için HOCL kullanılması düşünülüyorsa solüsyonun mesanede uzun süre bekletilmesi gerektiği sonucu çıkarılabilir. *M. odoratus/odoratimimus* ile enfekte hastaların bakımından sorumlu kişilerin el hijyeninde %70 etil alkol içeren dezenfektan kullanmasının etkili bir yöntem olabileceği ve bu yöntemle bakteri yayılımının engellenebileceği düşünülmüştür. Çalışmada kullandığımız antiseptiklerin farklı izolatlar üzerinde de kullanılması ile bu alanda daha detaylı bilimsel sonuçlara ulaşılabilecektir. *Myroides spp.* ile olan ÜSE tedavisinde intravezikal antiseptik kullanımı, deney hayvanlarında sistit modelleri gibi ileri çalışmalar ile değerlendirilebilir.

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Assessment of the Length of the Anterior and Posterior Commissure Lines According to Gender and Age

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Abstract

Aim: There are variations in the size and shape of the skull based on factors such as race, age, and gender. The anterior and posterior commissures are significant brain regions that serve as essential reference points for stereotactic and functional neurosurgical procedures, human brain mapping, and medical imaging techniques. Our study analyzed the length of the anterior-posterior commissure (AC-PC) with these demographic factors in patients who underwent deep brain stimulation (DBS) in the Turkish population.

Method: A total of 101 individuals, comprising 64 men and 37 women, were included in the study. Data were collected through magnetic resonance imaging performed according to the DBS protocol, with the anterior commissure (AC) and posterior commissure (PC) markings conducted using the StealthStation™ S8 Planning program. Receiver Operating Characteristic (ROC) analysis was performed to distinguish between male and female AC-PC measurements.

Results: The mean age of all participants was 60.32±11.31 years (range: 30-85), and the average AC-PC distance was 24.18±2.03 mm (range: 20.01-28.7). The AC-PC distances of males (24.83±1.986 mm) were statistically significantly greater than those of females (23.06±1.592 mm). A weak positive correlation was observed between the ages and AC-PC distances of the participants (r=0.432, P<0.001). According to the results of the univariate regression analysis, each additional year of age in males was associated with an increase of 0.083 mm (95% CI: 0.045 – 0.121) in AC-PC distance (R^2=0.235, P<0.001).

Conclusion: A comparison of data obtained from other studies indicates that the AC-PC distance in individuals of Turkish descent is nearly similar to that of the Asian population, yet shorter than that observed in Caucasian populations and even shorter than in Hispanic populations. These findings highlight the variation in AC-PC distances associated with ethnic origin.

Keywords: Anterior commissure, posterior commissure, stereotactic surgery.

Cinsiyet ve Yaşa Göre Ön ve Arka Komissür Hatlarının Uzunluğunun Değerlendirilmesi

Öz

Amaç: Irk, yaş ve cinsiyet gibi faktörlere bağlı olarak kafatasının boyutu ve şekli değişir. Ön ve arka komissürler, stereotaktik ve fonksiyonel nöroşirürjik prosedürler, insan beyni haritalaması ve tıbbi görüntüleme teknikleri için temel referans noktaları görevi gören önemli beyin bölgeleridir. Çalışmada, Türk popülasyonunda derin beyin stimülasyonu (DBS) uygulanan hastalarda bu demografik faktörlerle ön-arka komissür (AC-PC) uzunluğu analiz edildi.

Yöntem: Çalışmaya 64 erkek ve 37 kadın olmak üzere toplam 101 kişi dahil edildi. Veriler, StealthStationTM S8 Planning programı kullanılarak gerçekleştirilen ön komissür (AC) ve arka komissür (PC) işaretlemeleriyle DBS protokolüne göre gerçekleştirilen manyetik rezonans görüntüleme yoluyla toplandı. Erkek ve kadın AC-PC ölçümlerini ayırt etmek için Alıcı Çalışma Karakteristiği (ROC) analizi yapıldı.

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Bulgular: Tüm katılımcıların yaş ortalaması 60,32±11,31 yıl (aralığı: 30-85) ve ortalama AC-PC mesafesi 24,18±2,03 mm (aralığı: 20,01-28,7) idi. Erkeklerin AC-PC mesafeleri (24,83±1,986 mm) kadınlarınkinden (23,06±1,592 mm) istatistiksel olarak anlamlı derecede daha büyüktü. Katılımcıların yaşları ve AC-PC mesafeleri arasında zayıf bir pozitif korelasyon gözlendi (r=0,432, P<0,001). Tek değişkenli regresyon analizinin sonuçlarına göre, erkeklerde her ek yaş yılı AC-PC mesafesinde 0,083 mm'lik (95% CI: 0,045 – 0,121) bir artışla ilişkiliydi (R²=0,235, P<0,001).

Sonuç: Diğer çalışmalardan elde edilen verilerin karşılaştırılması, Türk kökenli bireylerde AC-PC mesafesinin Asya popülasyonuna neredeyse benzer olduğunu, ancak Kafkas popülasyonlarında gözlemlenenden ve hatta Hispanik popülasyonlardan bile daha kısa olduğunu göstermektedir. Bu bulgular, etnik kökenle ilişkili AC-PC mesafelerindeki çeşitliliği vurgulamaktadır.

Anahtar Sözcükler: Ön komissür, arka komissür, stereotaktik cerrahi.

Introduction

The anterior commissure (AC) and posterior commissure (PC) are prominent anatomical features that provide indirect guidance for locating intracerebral structures. Additionally, the inter-commissural line has proven to be a dependable reference for conducting stereotactic surgery. The swift progression of neuroimaging technologies has enabled a comprehensive analysis of the anatomical structures of the anterior and posterior commissures[1].

A Review of the Evolution of AC-PC Measurements

Following the shift from animal neurophysiological studies to the clinical application of stereotaxy in humans, neurosurgeons addressed the challenge of variability in the correlation between external skull landmarks and intracerebral targets[2]. Spiegel and Wycis accomplished this by utilizing intracerebral reference points, which have been essential for advancing human stereotactic techniques[3]. Talairach and his team observed that cerebral structures may not consistently align with skull landmarks, but the AC-PC line can be a reliable reference for locating intracerebral nuclei[4]. Schaltenbrand and Bailey created an atlas of the human brain that streamlined this system by designating the AC-PC line, which resides in the median (sagittal) plane, as one axis, and establishing a perpendicular line at the midpoint between the two commissures as the other was the pioneer in describing a prototype stereotactic frame designed for computer tomography (CT) scanners[5]. Subsequently, Lars Leksell became the first stereotactic neurosurgeon to modify his system to incorporate CT and magnetic resonance imaging (MRI). MRI has largely supplanted CT due to its superior anatomical visualization, allowing for precise identification of the AC-PC line and targets[6]. To mitigate spatial distortions in MRI, a novel approach has been developed that integrates CT imaging with image correlation software on a dedicated workstation[7-9]. In this study, we examined the significance of the AC-PC length in stereotactic surgeries concerning age and gender in the Turkish population.

Material and Methods

Patients who underwent cranial MRI at 1.5T and 3T for deep brain stimulation intervention between September 2016 and August 2024 at two different institutions. The AC-PC distance has been measured in T1w imaging with confirmation in multiplanar reconstruction and T2w imaging. The imaging parameters for T1w imaging consists of 256×256×170 or 512x512x180 matrices, with a spatial resolution of 0.9-1 mm in all

dimensions. Then the data was installed to Stealth Station S8 Surgical Navigation System, which assists in planning target coordinates for deep brain stimulation. The system automatically measured the AC-PC distance after the AC and PC were indicated on the images. For each subject, AC and PC points were controlled and manually corrected by a board certified neuroradiologist, if needed.

The data were evaluated using SPSS software (SPSS Inc., Chicago, IL, USA). Categorical variables were presented as frequencies and percentages (%), while continuous variables with normal distributions were reported as mean ± standard deviation (SD). The normality of the data was assessed using the Shapiro-Wilk and Kolmogorov-Smirnov tests, depending on sample size. The Student's t-test was applied to the normally distributed data to compare the two independent groups. Receiver Operating Characteristic (ROC) analysis was conducted to determine the optimal cut-off value for distinguishing AC-PC measurements between males and females. The area under the ROC curve (AUC) was assessed, along with 95% confidence intervals, and the AUC values were classified as follows: 0.9-1 indicates excellent performance, 0.8-0.9 denotes good performance, 0.7-0.8 is considered fair, 0.6-0.7 reflects poor performance, and 0.5-0.6 represents very poor performance. The optimal cut-off value was identified using the Youden index, which maximizes sensitivity and specificity to determine the most appropriate threshold in the ROC analysis. Based on data normality, Pearson correlation analysis was employed to assess the relationship between age and AC-PC values. Univariate regression analysis examined the variation in AC-PC measurements according to age. A P-value of <0.05 was considered statistically significant for all tests.

Ethical Statement: This study was carried out with the approval of the Ethics Committee of Pamukkale University, dated 14.10.2024 and numbered E-60116787-020-596472. A signed subject consent form in accordance with the Declaration of Helsinki was obtained from each participant.

Results

The study analysed data from 101 patients, including 64 (63.4%) males and 37 (36.6%) females. The mean age of all cases was 60.32±11.31 years (range: 30-85), and the mean AC-PC length was 24.18±2.03 mm (range: 20.01-28.7). Statistical findings comparing AC-PC distances between genders are presented in Table 1. The AC-PC distances of males (24.83±1.986 mm) were statistically significantly higher than those of females (23.06±1.592 mm) (Table 1).

Table 1. Statistical findings for the comparison of AC-PC distances between genders

		Male (n=64)	**Female (n=37)**	***P* values**
AC-PC distance (mm)		24.83±1.986	23.06±1.592	**<0.001**

Student's t-test with mean±standard deviation (SD)

AC-PC: Anterior commissure-posterior commissure

According to the results of the ROC analysis aimed to determine the optimal cut-off point for the differentiation of AC-PC distances between genders, the discriminatory power of the AC-PC distance was significant at a fair level with an AUC 95% CI = 0.770 (0.675 – 0.865) (P<0.001). The best cut-off point for the AC-PC distance was determined as 23.65

mm (Sensitivity: 71.88% (95% CI: 60.86 - 82.89), Specificity: 75.68% (61.85 - 89.50), PPV: 83.64% (73.86 - 93.41), NPV: 60.87% (46.77 - 74.97), and Accuracy: 73.27% (64.64 - 81.90)). The distribution of AC-PC distances between gender groups is shown in Figure 1.a, and the ROC curve is shown in Figure 1.b.

Figure 1. a. Boxplot showing the distribution of anterior commissure-posterior commissure (AC-PC) distances between genders

b. ROC curve to determine the best cut-off point for discrimination of AC-PC distances between genders
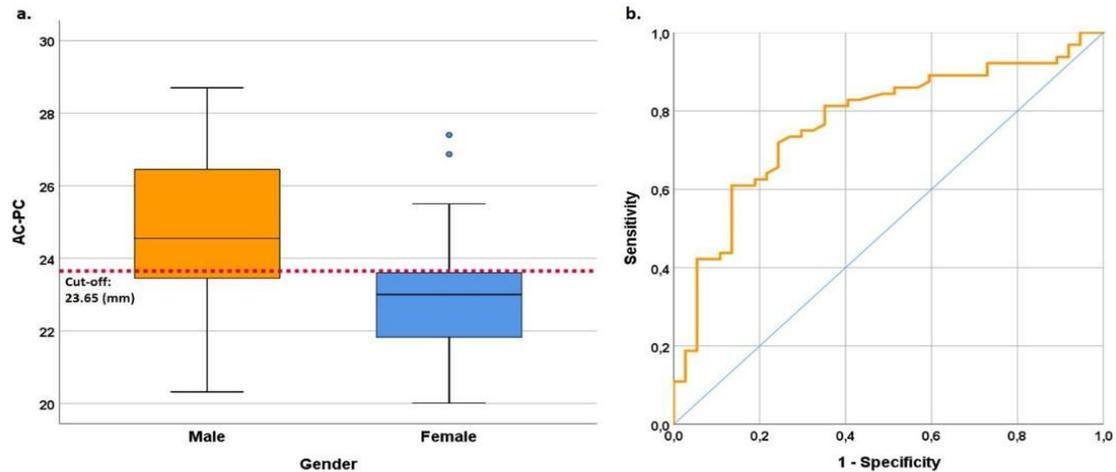
A weak positive correlation was found between all patients' ages and AC-PC distances (r=0.432, *P*<0.001). When evaluated separately by gender, a moderate positive correlation was found between the ages and AC-PC distances of male patients (r=0.485, *P*<0.001, Figure 2.a), while no significant correlation was found between the ages and AC-PC distances of female patients (r=0.300, *P*=0.071, Figure 2.b). According to the results of univariate regression analysis, each one-year increase in age was associated with a 0.083 (95% CI: 0.045 – 0.121) mm increase in AC-PC distance in males (R²=0.235, *P*<0.001).

Figure 2. a. Scatter plot with regression curve showing the relationship between age and anterior commissure-posterior commissure (AC-PC) distances in male patients

b. Scatter plot with regression curve showing the relationship between age and AC-PC distances in female patients
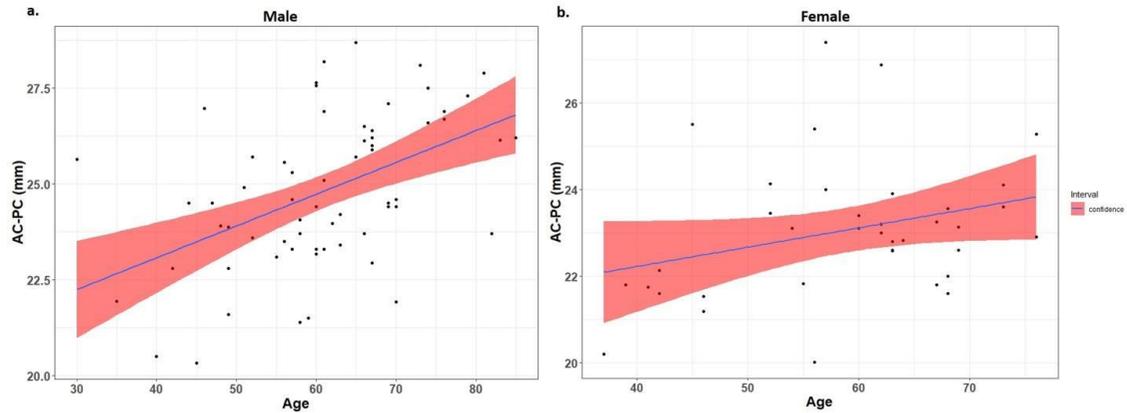
Boxplots showing the distribution of AC-PC distances according to the World Health Organization's (WHO) age classifications (Young Adult: 25-44, Middle-Aged Adult: 45-59, Late Middle-Aged Adult: 60-64, Young Old: 65-74, Middle Old: 75-84) are shown for males in Figure 3.a and for females in Figure 3.b. In addition, descriptive statistics of AC-PC distances according to age classifications are presented in Table 2.

Figure 3. a. Box plots showing the distribution of anterior commissure-posterior commissure (AC-PC) distances of male patients according to World Health Organisation (WHO) age classifications

b. Box plots showing the distribution of AC-PC distances in female patients according to World Health Organisation (WHO) age classifications
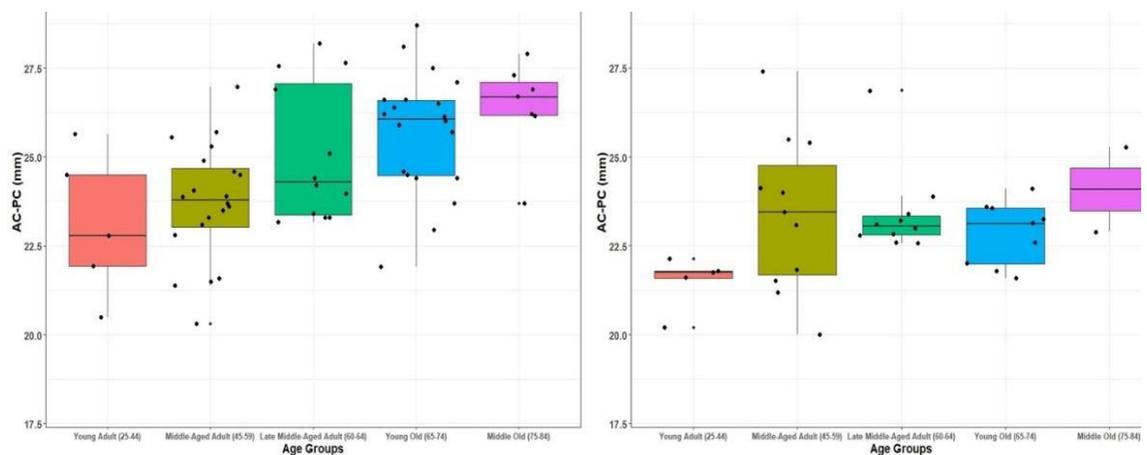
Table 2. Descriptive statistics of AC-PC distances between genders according to World Health Organisation (WHO) age classifications

Age groups	Male				Female			
	n	Mean±SD	min	max	n	Mean±SD	min	max
25-44	5	23.07±2.04	20.50	25.64	5	21.5±0.75	20.20	22.13
45-59	20	23.71±1.64	20.32	26.97	11	23.41±2.19	20.01	27.40
60-64	12	25.1±1.93	23.17	28.20	10	23.43±1.27	22.58	26.87
65-74	20	25.7±1.7	21.92	28.70	9	22.85±0.89	21.60	24.10
75-84	7	26.41±1.34	23.70	27.90	2	24.09±1.68	22.90	25.28

AC-PC: Anterior commissure-posterior commissure, SD: Standard deviation

Discussion

Contemporary stereotactic functional neurosurgery procedures employ a coordinate framework based on the AC and PC locations[10]. Preoperative target identification can be accomplished through direct or indirect localization, especially for deep brain stimulation interventions. Surgeons can directly select targets by visually referencing the patient's MRI scan or by utilizing automated selection techniques as described in the work of D'Haese et al[11]. Indirect target selection employs standardized coordinates derived from anatomical atlases like the Schaltenbrand-Wahren atlas. This method is often utilized when targets are not identifiable on MRI scans[5]. The anterior and posterior commissures serve as key reference points in the conventional stereotactic coordinate framework. According to the established conventions of the Schaltenbrand-Wahren atlas, the AC and PC are identified as two specific points in the midsagittal plane that exhibit the minimal distance within the ventricles between the commissures. The mid-commissure point (MC), the central point along the AC-PC line, is frequently utilized as the origin for the AC-PC reference framework[5]. Both commissures are recognized as reliable and consistent anatomical structures within the brain, and they can be readily visualized using current MRI systems, including those operating at 1.5T or 3.0T[12]. Given that the AC and PC are situated at the front and rear of the deep brain, respectively, and are separated by a significant distance, they serve as important reference points for the indirect localization of brain structures, particularly in the context of stereotactic surgery[13-15].

Generally, the AC-PC distance most commonly reported is within the range of 21 mm to 28 mm[12]. Previous studies involving a population from Nepal, consisting of 47 individuals, reported an average AC-PC distance of 24.86 ± 2.08 mm for the Nepalese group[12]. In a study involving 211 patients focused on inter-racial analysis, the measurements for 12 Asian patients were reported as 24.6 ± 2.21 mm. In comparison, 160 Caucasian patients had 25.2 ± 2 mm measurements, and 35 Hispanic patients measured 23.6 ± 1.98 mm[1]. According to these results, the AC-PC distances in individuals of Asian and Nepalese descent are similar to the values observed in our study. In contrast, the Caucasian population exhibited more extensive measurements. These findings highlight the variation in AC-PC distance associated with ethnic background.

A statistically significant positive correlation, albeit weak, was observed between the ages of all patients and their AC-PC distances. Similar to our observation of a linear increase in AC-PC distance with advancing age, Lee et al. and Dabadil et al. have reported comparable results[1,12]. When the correlation was assessed separately by gender, a statistically significant moderate positive correlation was found between the ages of male patients and their AC-PC distances (r=0.485, P<0.001). Conversely, a significant correlation was not found between the ages of female patients and their AC-PC distances.

Lee et al. observed that the AC-PC length continues to increase until the age of 75 years in Caucasians, while in Hispanics, the maximum distance is reached at 45 years, followed by a gradual decline after that[1]. We found a similar result; according to the results of the univariate regression analysis, each additional year of age in men was associated with an increase of 0.083 mm (95% CI: 0.045 – 0.121) in the AC-PC distance. One of the main factors believed to contribute to the increase in AC-PC distance with age is the gradual decline of gray matter in the brain occurring between the ages of 20 and 50[16]. Furthermore, alterations in the cerebrospinal fluid (CSF) regions and the decrease in the volume of the cerebral hemispheres with aging may account for the variations observed in inter-commissural distances[17].

In this study, the AC-PC distances for men (24.83±1.986) were statistically significantly greater than those for women (23.06±1.592). Research on brain volume indicates that men have an average of 91 ml more cerebrum volume and 20 ml more cerebrospinal fluid volume than women[18]. This difference may be attributed to the fact that men typically possess larger brain and cerebrospinal fluid (CSF) volumes.

Conclusion

These findings highlight the variation in AC-PC distance associated with ethnic background. In conclusion, caution should be exercised when utilizing existing atlases in functional stereotactic procedures.

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Comparison of Fatigue Severity in Individuals with Vestibular Hypofunction[*]

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Abstract

Aim: The aim is to compare fatigue severity in patients with unilateral and bilateral vestibular hypofunction.

Method: Patients with complaints of dizziness and balance were included in the study. The degree and direction of hypofunction of the patients were determined with videonystagmography test. Numerical Pain Scale was used to evaluate fatigue severity. Fatigue severity in patients with unilateral and bilateral vestibular hypofunction (VH) was compared.

Results: 100 patients with a mean age of 49.25±14.67 years were included in the study. It was observed that 37% of these patients had Right VH, 30% had Left VH and 33% had Bilateral VH. According to the hypofunction table, the fatigue severity of the groups was 6.57±1.96 in Right VH, 6.79±1.34 in Left VH and 7.51±1.44 in Bilateral VH. When fatigue severity was compared between the groups, no statistical superiority was found (p≥0.05).

Conclusion: There is no difference between the fatigue levels in Unilateral and Bilateral VH patients.

Keywords: Bilateral vestibular hypofunction, unilateral vestibular hypofunction, fatigue.

Vestibüler Hipofonksiyonu Olan Bireylerde Yorgunluk Şiddetlerinin Karşılaştırılması

Öz

Amaç: Unilateral ve bilateral vestibüler hipofonksiyonu (VH) olan hastalarda yorgunluk şiddetini karşılaştırmak amaçlanmıştır.

Yöntem: Baş dönmesi ve denge şikayeti olan hastalar çalışmaya katıldı. Hastaların hipofonksiyonunun derecesi ve yönü videonistagmografi testi ile belirlendi. Yorgunluk şiddetini değerlendirmek için Sayısal Ağrı Skalası kullanıldı. Unilateral ve bilateral vestibüler hipofonksiyonu olan hastalarda yorgunluk şiddeti karşılaştırıldı.

Bulgular: Çalışmaya yaş ortalaması 49,25±14,67 yıl olan 100 hasta dahil edildi. Bu hastaların %37'sinin Sağ VH, %30'unun Sol VH ve %33'ünün Bilateral VH olduğu görüldü. Hipofonksiyon tablosuna göre grupların yorgunluk şiddeti Sağ VH'de 6,57±1,96, Sol VH'de 6,79±1,34 ve Bilateral VH'de 7,51±1,44 idi. Gruplar arasında yorgunluk şiddeti karşılaştırıldığında istatistiksel olarak üstünlük bulunmamıştır (p≥0,05).

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Sonuç: Unilateral ve bilateral VH hastalarında yorgunluk seviyeleri arasında fark yoktur.

Anahtar Sözcükler: Bilateral vestibüler hipofonksiyon, unilateral vestibüler hipofonksiyon, yorgunluk.

Introduction

Vestibular hypofunction (VH) is a condition resulting from partial or complete loss of vestibular function, occurring in the vestibular organs or the vestibular branch of the eighth cranial nerve, known as the vestibulocochlear nerve[1]. If the involvement is unilateral, it is defined as unilateral vestibular hypofunction (UVH), and if bilateral, it is termed bilateral vestibular hypofunction (BVH)[2]. The pathologies that lead to VH include Benign Paroxysmal Positional Vertigo (BPPV), Meniere's disease, labyrinthitis, vestibular neuritis, bilateral vestibular loss, and vestibular paroxysmia[3,4].

UVH is characterized by dizziness and balance disorders, accounting for approximately 14-20% of all inner ear pathologies[5]. If left untreated, it can lead to various chronic symptoms such as impaired movement and spatial perception, cognitive problems, autonomic complaints, and increased fatigue[6]. BVH, on the other hand, manifests with oscillopsia, imbalance, vertigo, dizziness, and cognitive and autonomic disorders. In addition to neurological symptoms, auditory symptoms such as hearing loss or tinnitus may also be present[7].

Fatigue severity in vestibular diseases is a significant factor that affects patients' participation in daily life activities. Disorders of the balance system can lead to increased energy expenditure due to the continuous effort to maintain stability, resulting in physical fatigue. Additionally, dizziness, disorientation, and cognitive overload caused by vestibular dysfunction can further contribute to emotional fatigue, negatively impacting overall well-being. Research indicates that chronic fatigue is commonly observed in vestibular diseases and significantly reduces quality of life. Therefore, assessing and managing fatigue severity should be considered a crucial component of the rehabilitation process for vestibular patients[8,9].

While fatigue is observed in patients with vestibular hypofunction, there is no clear evidence as to which group (unilateral or bilateral) experiences more severe fatigue. The aim of this study is to compare the severity of fatigue in patients with right and left unilateral and bilateral vestibular hypofunction.

Material and Methods

Study Design

The study included patients who presented with dizziness and balance problems at the Vestibular Rehabilitation Unit of Güneşli Erdem Hospital. Ethical approval was obtained from the Ethics Committee of Nişantaşı University on 29/08/2024 with the number 2024/01-SB. Informed consent forms were signed by patients who met the study criteria and were diagnosed with VH. Inclusion criteria for the study were being between the ages of 18 and 85 and having a diagnosis of peripheral VH. Exclusion criteria included inability to communicate and having neurological disorders. The degree and direction of hypofunction in patients were determined using videonystagmography testing. A demographic information form was used to collect details on age, gender, occupation, smoking and alcohol use, accompanying illnesses, surgeries, medications, daily activity

level, medical history, onset and type of disease, falls in the past year, fear of heights, fear of darkness, and discomfort in crowded places.

Hypotheses of the Study

H1: Unilateral and bilateral VH patients differ in terms of fatigue severity.

Videonystagmography (VNG): The bithermal caloric test, a key component of the VNG assessment, is recognized as the gold standard for diagnosing vestibular hypofunction. It plays a crucial role in determining the severity, location, and whether the dysfunction originates from a central or peripheral source[10]. During the test, thermal stimuli are used to assess the vestibulo-ocular reflex and identify the affected side. The procedure involves delivering 8 liters of air at 50°C and 24°C to each tympanic membrane sequentially for 60 seconds, with 5-minute rest intervals. Involuntary eye movements (nystagmus) are then recorded for 120-140 seconds, calculated, and graphically analyzed[11]. When interpreting the results, the onset time, speed, and suppression of nystagmus during fixation are considered[12].

Assessment Methods

Demographic Data Form: It is a form consisting of questions such as name, surname, age, smoking and alcohol consumption, previous illnesses and/or surgeries, medications used, whether there is a history of falls, their frequency, fear of heights, whether they are bothered by the dark, severity of fatigue, etc.

Numerical Pain Scale: Fatigue was assessed using the Numerical Pain Scale. This scale is scored from 0-10 cm, where 0 cm represents "no fatigue" and 10 cm represents "extreme fatigue." Patients were asked to rate their fatigue on the scale from 0 to 10, and the provided value was recorded.

Data Analysis

Data analysis was performed using the "Statistical Package for Social Sciences" (SPSS version 25.0, SPSS Inc., Chicago, IL, USA). The demographic characteristics of the patients were expressed as numbers, percentages, means, and standard deviations. The One-Sample Kolmogorov-Smirnov test was used to check the normality of the data. One-Way ANOVA was used for statistical analysis.

The sample size was determined using the "G*Power sample size calculator". The sample size was calculated as 30 participants using the "ANOVA: Fixed effects, omnibus, one-way" design for three groups with a single repeated measurement, with a power of 95% (α=0.05, β=0.95, λ=19.20, F=3.35) and an effect size of 0.05.

Results

The study was completed with 100 VH patients (mean age 49.25±14.67), aged between 18-65 years. The demographic characteristics of the VH patients are shown in Table 1.

Table 1. Demographic characteristics

		Frequency (n)	Percent (%)
Gender	Female	72	72
	Male	28	28
Cigarette Consumption	No	74	74
	Yes	26	26
Alcohol Consumption	No	100	100
	Yes	-	-
Diagnosis	Right VH	37	37
	Left VH	30	30
	BVH	33	33
		Mean±Sd	
Age (years)		49,25±14,67	

Sd: Standard Deviation; VH: Vestibular Hypofunction; BVH: Bilateral Vestibular Hypofunction; n: Number of People; %: Percent

The comparison of fatigue severity between groups is given in Table 2. There was no difference in fatigue severity between groups (p ≥ 0,05).

Table 2. Fatigue severity assessment results

Fatigue Severity Assessment	Right VH (n=37)	Left VH (n=30)	BVH (n=33)	
	Mean±sd	Mean±sd	Mean±sd	p
Numerical Pain Scale (cm)	6,57±1,96	6,79±1,34	7,51±1,44	0,055

One-Way ANOVA test; SD: Standard Deviation; VH: Vestibular Hypofunction; BVH: Bilateral Vestibular Hypofunction; n: Number of People; * (p≤ 0.05).

Discussion

In this study, the hypothesis that fatigue severity differs between unilateral and bilateral vestibular hypofunction patients was tested; however, our findings did not support this hypothesis, as no significant difference in fatigue levels was found between the two groups.

It is well known that emotional fatigue can lead to physical fatigue. Accordingly, studies in the literature have predominantly focused on emotional fatigue in individuals with vestibular hypofunction, emphasizing its impact on overall well-being.

Extensive research on animals has indicated that damage to the vestibular system may be linked to cognitive deficits. However, human studies on this topic remain relatively limited compared to animal-based research. In recent years, emerging evidence suggests that vestibular disorders can lead to cognitive impairment. This growing body of evidence has spurred further investigations into the interaction between the cognitive system and the vestibular system, as well as the underlying pathophysiological mechanisms.

A 2022 review by Divya et al. examined the current literature on the pathophysiology of cognitive-vestibular interactions, highlighting the clinical significance of these findings.

The review involved a systematic search using keywords such as "brain fog", "cognition", "cognitive impairment", "chronic fatigue", "attention", "memory", "spatial orientation" and "vestibular hypofunction". The results revealed that individuals with vestibular disorders often experience long-term deficits in both spatial and non-spatial cognitive domains. While the exact mechanisms linking the vestibular system to cognitive functions remain unclear, various neurobiological correlates have been identified. The authors also stressed the need for further studies to identify individuals at risk of cognitive decline and to determine whether treating vestibular hypofunction (VH) can reverse these deficits[13]. This study aimed to assess the presence of chronic fatigue in individuals with VH and to explore whether the impact of hypofunction in specific vestibular regions correlates with the severity of fatigue.

In a 2006 study by Hanes and colleagues, it was noted that patients with vestibular disorders often report symptoms such as chronic fatigue, brain fog, and memory loss. However, systematic research into the extent of the vestibular system's involvement in cognitive functions has only recently begun. As our understanding of the pathophysiology of cognitive decline and imaging technologies has advanced, this previously overlooked area of research is gaining attention. Physical fatigue can lead to cognitive dysfunction, triggering a condition known as "brain fog". This condition manifests with symptoms such as difficulty concentrating, memory problems, and mental cloudiness. Brain fog symptoms are particularly common in cases of chronic fatigue. Animal models have demonstrated that vestibular damage can result in a variety of cognitive deficits, particularly those related to spatial memory and navigation. Emerging human studies also suggest that vestibular loss can cause long-term cognitive impairments not only in visuospatial abilities but also in areas such as memory, attention, and executive function[14].

Functional imaging has revealed that the vestibular system is connected to several cortical areas, including the hippocampus, inferior parietal lobe, and temporal gyrus. Specifically, the transmission of vestibular signals to the hippocampus plays a crucial role in cognitive processes such as spatial memory and navigation. Additionally, the connections with the inferior parietal lobule and superior temporal gyrus facilitate the integration of vestibular inputs in attention and perceptual processing. The interactions with these cortical regions support the comprehensive role of the vestibular system in cognitive functions. Therefore, the connections between the vestibular system and these cortical areas are critical for a holistic understanding of cognitive processes[15]. In a 2003 study by Brandt et al., comparisons between patients with bilateral vestibular hypofunction (BVH) and healthy controls showed that those with BVH had significantly reduced hippocampal volumes[16]. Similarly, a 2007 study by Hüfner et al. found that hippocampal atrophy was more pronounced in BVH patients compared to those with unilateral vestibular hypofunction (UVH)[17].

Further research by Dieterich and colleagues in 2008 suggested that, beyond the hippocampus, other brain regions such as the temporoparietal cortex, retrosplenial cortex, putamen, anterior cingulate cortex, insula, and subiculum also receive vestibular projections. This finding highlights that patients with VH may experience cognitive

difficulties due to dysfunctions in these areas, requiring greater effort to perform daily tasks, which in turn may contribute to chronic fatigue[18].

In a 2015 study by Harun et al., it was found that VH primarily impacts cognitive rather than functional activities, with cognitive impairment being a major predictor of disability and handicap in individuals with VH. The authors also noted that fatigue, as a secondary consequence of cognitive impairment, negatively affects the quality of life in these patients[19].

In this study, we evaluated the presence of chronic fatigue in patients with both unilateral and bilateral VH, taking into account the cognitive and daily life impairments linked to the affected vestibular regions. Our findings showed no significant difference in fatigue levels between individuals with right-sided, left-sided, or bilateral vestibular hypofunction, leading us to conclude that VH can lead to fatigue regardless of the affected side.

A 2018 study by Tramontano et al. explored the effects of vestibular rehabilitation on balance, fatigue, and daily living activities in patients with multiple sclerosis (MS). In a sample of 30 participants with EDSS scores of 6-7, the experimental group (which received vestibular rehabilitation) showed significant improvements in fatigue levels and daily activity performance compared to the control group. This research demonstrated that vestibular rehabilitation can help reduce fatigue and improve balance and daily functioning in MS patients[20].

Similarly, a 2022 study by Ghaffari investigated the effects of vestibular rehabilitation on fatigue and depression in stroke patients. The study found that patients who underwent 24 sessions of vestibular rehabilitation showed significant improvements in fatigue levels, as measured by the Fatigue Impact Scale and Fatigue Assessment Scale, compared to those who received standard rehabilitation. These results suggest that vestibular rehabilitation can effectively alleviate fatigue and improve daily functioning[21].

Conclusion

These findings highlight the importance of rehabilitation programs for patients with vestibular hypofunction in clinical settings. In particular, vestibular rehabilitation may serve as an effective intervention for managing fatigue, enhancing participation in daily activities, and ultimately improving quality of life. Furthermore, considering that fatigue severity does not differ based on whether vestibular dysfunction is unilateral or bilateral, rehabilitation approaches can be applied similarly across all patient groups. Accordingly, clinicians can incorporate vestibular rehabilitation into standard treatment plans to support patients' functional independence and overall well-being.

Limitations of the Study

• Using the Numerical Pain Scale to assess fatigue severity may prevent objective results.

• The sample size was limited to 100 participants.

• There was an inability to match the number of patients with unilateral and bilateral vestibular hypofunction equally

Conflicts of Interest/Competing Interests Employment: The authors are not employed by any organization.

Financial Interests: The authors have no financial interests.

Non-financial Interests: The authors have no non-financial interests.

Strengths of the Study

• Highlighted fatigue as a symptom that should be considered in vestibular hypofunction.

• Contributed to the limited number of studies on this subject in the literature.

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The Effect of Virtual Reality Glasses on Vital Signs and State Anxiety Level in Cancer Patients Receiving Chemotherapy for the First Time: A Semi-Experimental Study[*]

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Abstract

Aim: This study was conducted as a non-randomized control group experimental study to determine the effect of virtual reality glasses on vital signs and state anxiety levels in cancer patients.

Method: The sample of the study consisted of 30 patients who were assigned to the intervention and control groups by the stratified sampling method. After the chemotherapy infusion was started, the intervention group was provided with relaxing 3D videos of their choice. Both groups were re-administered the situational anxiety scale with the measurement of vital signs at the end of the chemotherapy infusion.

Results: The mean score of the post-chemotherapy state anxiety scale in the intervention group was 30.60 ± 8.20, while in the control group it was 39.70 ± 8.82, and this difference was statistically significantly higher ($p < 0.05$). Although there was no statistical significance in the saturation values measured before and after chemotherapy in the intervention group, it was determined to be higher after chemotherapy ($p > 0.05$). When the control group was examined, although there was a statistically significant difference in heart rate and saturation values ($t = 3.962$; $p = 0.000$, $Z = -2.837$; $p = 0.005$) before chemotherapy, it was lower than the values of the intervention group.

Conclusion: As a result, virtual reality glasses had a positive effect on the anxiety levels and vital signs of the patients.

Keywords: Cancer, chemotherapy, nursing, state anxiety level, virtual reality.

İlk Kez Kemoterapi Alan Kanser Hastalarında Sanal Gerçeklik Gözlüklerinin Yaşamsal Bulgular ve Durumluk Kaygı Düzeyi Üzerine Etkisi: Yarı Deneysel Bir Çalışma

Öz

Amaç: Bu çalışma, kanser hastalarında sanal gerçeklik gözlüklerinin yaşam belirtileri ve durumluk kaygı düzeylerine etkisini belirlemek amacıyla randomize olmayan kontrol gruplu deneysel bir çalışma olarak yapılmıştır.

Yöntem: Araştırmanın örneklemini tabakalı örnekleme yöntemiyle müdahale ve kontrol grubuna atanan 30 hasta oluşturmuştur. Kemoterapi infüzyonu başlatıldıktan sonra müdahale grubuna kendi seçecekleri rahatlatıcı 3 boyutlu videolar sunuldu. Kemoterapi infüzyonu sonunda yaşamsal belirtilerin ölçümü ile her iki gruba da durumsal kaygı ölçeği yeniden uygulandı.

Bulgular: Müdahale grubunda kemoterapi sonrası durumluk kaygı ölçeği puanı ortalaması $30,60 \pm 8,20$, kontrol grubunda ise $39,70 \pm 8,82$ olup bu fark istatistiksel olarak anlamlı derecede yüksekti ($p < 0,05$). Müdahale grubunda kemoterapi öncesi ve sonrası ölçülen satürasyon değerlerinde istatistiksel olarak

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anlamlı fark bulunmazken, kemoterapi sonrası daha yüksek olduğu belirlendi (p>0.05).Kontrol grubu incelendiğinde kemoterapi öncesi kalp hızı ve satürasyon değerlerinde istatistiksel olarak anlamlı fark olmasına rağmen (t=3.962; p=0.000, Z=-2.837; p=0.005), müdahale grubunun değerlerinden düşüktü.

Sonuç: Sonuç olarak sanal gerçeklik gözlüklerinin hastaların kaygı düzeyleri ve yaşamsal belirtileri üzerinde olumlu etkisi olduğu görüldü.

Anahtar Sözcükler: Kanser, kemoterapi, hemşirelik, durumluk kaygı düzeyi, sanal gerçeklik.

Introduction

Cancer is a significant health problem seen in our country and around the world as a disease with a high mortality and morbidity rate that negatively affects a person's quality of life[1]. When the causes of death due to diseases in our country are examined, according to 2019 data from the Turkish Statistical Institute (TURKSTAT), cancer ranks first as the cause of death after cardiovascular diseases, with a rate of 18.4%[2]. According to the latest global cancer data of Globocan 2020, it is observed that 126,335 people died due to cancer in our country in 2020 alone[3]. Chemotherapy is one of the cornerstones of the treatment of cancer, which is increasingly common. Although chemotherapy is a beneficial treatment for the patient's recovery, it has been reported in the literature that patients experience anxiety before, during or after chemotherapy. People diagnosed with cancer may experience psychological distress in the first place by participating in thoughts such as the difficulty of cancer treatment, the side effects of treatment, the unknowns of the disease, the fear of recurrence even if the disease regresses, and the fear of death[4,5]. With the help of the treatments applied today, patients can no longer be prevented from experiencing intense anxiety and concern, even if they believe more that they can recover. The studies show that cancer patients' anxiety and concern levels are pretty high[6,7]. A study found that virtual reality glasses gave positive results and supported psychological wellbeing in pediatric oncology patients[8]. The negativity experienced in the emotional state leads to a delay in the recovery of the patients, the length of hospitalization is prolonged, and the patient's quality of life is reduced. To reduce these negatives, it is crucial to observe the symptoms of anxiety and depression well and to start treatment in cancer patients[9,10].

In general, pharmacological and non-pharmacological methods are used to treat anxiety. Distraction is a simple and effective method of managing pain and anxiety. One of the methods used as a distraction among non-pharmacological anti-anxiety methods is virtual reality (VR) technology. What makes virtual reality a powerful distraction is the ability to simultaneously engage different senses with synthetic stimuli such as visual images, spatial sounds, and sometimes tactile and olfactory feedback[10,11]. With these multi-modal stimuli, a person becomes visually isolated from the medical environment by focusing on the stimuli he/she likes, and a decrease in negative emotions of the person is observed[11-13]. Various studies have shown that high-quality and interactive VR system technology is more effective in diverting attention[11]. When the analyses using this technology are examined, it is seen that it is used to relieve cancer-related symptoms during chemotherapy infusion, reduce pain and anxiety during wound care and physical therapy, and obtain effective results[14]. In another study conducted with patients with chronic low back pain, VR glasses were found to reduce pain severity[15]. In Turkey, a limited number of studies are reached when the literature review is conducted immersive

environment provided by VR in the field of medicine. According to the studies conducted, no study has been found in the literature that has previously investigated the effects of VR glasses on the anxiety levels of cancer patients in Turkey. From this point of view, it is thought that nursing practices that support patients to improve their emotional states can be included in the care given and increase therapeutic patient-nurse interactions, and this study was conducted.

This study aimed to determine the effect of VR glasses on vital signs and state anxiety levels in cancer patients receiving chemotherapy for the first time. The study was conducted as an experimental study with a non-randomized control group.

The Hypotheses of the Research

H0-1: VR glasses do not affect the pulse of cancer patients receiving chemotherapy for the first time.

H1-1: VR glasses affect the pulse of cancer patients receiving chemotherapy for the first time.

HO-2: VR glasses do not affect the blood pressure of cancer patients receiving chemotherapy for the first time.

H1-2: VR glasses affect the blood pressure of cancer patients receiving chemotherapy for the first time.

H0-3: VR glasses do not affect the oxygen saturation levels of cancer patients receiving chemotherapy for the first time.

H:1-3: VR glasses affect the oxygen saturation levels of cancer patients receiving chemotherapy for the first time.

H0-4: VR glasses do not affect or reduce the state anxiety levels of cancer patients receiving chemotherapy for the first time.

H1-4: VR glasses reduce the state anxiety levels of cancer patients receiving chemotherapy for the first time.

Material and Methods

Place and Characteristics of the Research

The research was conducted in an oncology hospital in Ankara with patients receiving chemotherapy for the first time in a day treatment unit and a medical oncology service. Chemotherapy is administered in four sessions: 08.00 - 09.30 in the morning and 13.00-15.30 in the afternoon. It was carried out after removing the patient's relatives from the room to allow the patient to answer the questions more easily during the research and to prevent the study from being affected by external factors. In this process, the patient has been provided to fill out the forms himself by helping those who want to get help.

The Population and Sample of the Research

According to the information received from the hospital where the research was conducted, the number of patients admitted to the hospital to receive the chemotherapy course for the first time in 2019 was 1400 people; the information was obtained from the records. In the sampling calculation, the minimum number of patients to be recruited

per group was 26, with the G Power 3.1 package program with an effect size of 0.2 and a power of 80% (for all variables).

As a result of the power analysis made with the data obtained from the study;

Effect size f=0.5434490

The effect size obtained from the study, 5% margin of error and the power of the study for 60 samples (n1:30-n2:30) were found to be 100% (Posthoc performed using state anxiety score).

The population of the study consisted of adult patients who applied to the medical oncology service for the first time to receive a course of chemotherapy located at the day treatment unit of an oncology hospital in Ankara between 27/01/-01/06/2020 with the diagnosis of I-II-III stage cancer. The study sample consisted of a total of 63 patients, including 31 patients for the intervention group who were willing to participate in the study and met the criteria for participation in the study and 32 patients for the control group. One patient in the intervention group and two patients in the control group were excluded from the study because their general condition worsened. Patients included in the study were those who were older than 18, had disease stages I-II-III, knew the diagnosis, did not receive radiotherapy and received chemotherapy for the first time, could read and speak Turkish, had no history of seizures, had no cranial metastasis, had not been diagnosed with psychiatric disorders, and did not have dementia, hearing/sighted and volunteer patients who agreed to participate in the study were included.

Patients who are in Stage IV in terms of disease stage, those who have vertigo, those who have received chemotherapy before, those who have hyperemesis during pregnancy, those who tend to nausea and vomit during their travels, and those who do not want to participate in the study were not included in the study. Therefore, chemotherapy or cancer type was not considered while selecting the sample.

Data Collection

The study was conducted at an Oncology Hospital Hacettepe in Ankara with 63 patients with the diagnosis of stage I-II-III cancer who applied to the medical oncology service and day treatment unit between 27/01/-01/06/2020 and were accepted to be included in the study after will receive a chemotherapy course for the first time. Thirty-one patients were evaluated as an intervention group and 32 as a control group. It was explained to the 63 patients, who were considered the sample group, that the participation was voluntary and that there were options to leave if desired at any stage of the research. The study's data were obtained from the patients who agreed to participate after detailed information was given about the study.

Patients who were evaluated as an intervention group that met the research criteria were provided with a patient identification form before the start of chemotherapy infusion, their first vital signs were measured and recorded in the vital signs follow-up form, and then the patient was provided with a state anxiety scale to be filled in. During chemotherapy, the patient was placed in a semi-fowler position in their bed. After the chemotherapy infusion started, wearing VR glasses, and watching videos such as a world tour, a walk in the forest, nature walks, and a beach for between 30 minutes and 40

minutes, depending on the patient's viewing time. After the chemotherapy infusion was completed, the vital signs measurement was repeated and recorded, and the state anxiety scale was provided to be filled in again.

Patients who were evaluated as a control group were provided with a patient identification form before the start of chemotherapy infusion, their first vital signs were measured and recorded in the vital signs follow-up form, and the patients were provided with a state anxiety scale to be filled in. During chemotherapy, the patient was given in a semi-fowler position in their bed. There was no application during the chemotherapy infusion; the patient was subjected to routine chemotherapy performed in the hospital. The patients in the control group remained in the same position as those in the experimental group during chemotherapy and just rested. After the chemotherapy infusion was completed, vital signs (blood pressure, pulse, respiration, saturation) were monitored, and the state anxiety scale was applied. After the research, VR was used for the patients in the control group who wanted it in the following cures.

Family members stayed in the room in both groups, but the patient was asked not to communicate with the patient during the VR glasses application.

Patient Identification Form: Firstly, the patients were informed about the research in the introduction form. Finally, 11 open-ended questions about age, gender, occupation, employment status, etc., were asked of the patients who agreed to participate in the study.

Spielberger State Anxiety Inventory: The Spielberger state anxiety inventory was developed by Spielberger in 1966. In 1976, Öner and Le Compe (1983) translated it into Turkish, and validity and reliability studies were carried out in 1977[16]. The Spielberger state anxiety inventory consists of 20 questions and four ratings (never, sometimes, frequently, almost always), and it is applied to understand how people are feeling at the moment. The scale contains two types of statements with 20 items. Direct statements express negative emotions, and reverse statements express positive emotions. In the state anxiety scale, the reverse statements are items 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20. State anxiety scores are obtained by subtracting the total score for direct statements from the total score for reverse statements and adding the predetermined invariant value. The constant value for the state anxiety scale is 50. A high score indicates a high level of anxiety. It is reported that the reliability coefficients of the scale vary between 0.83 and 0.87.

In this study, the Cronbach-α reliability coefficient was found to be 0.92 before chemotherapy of the intervention group, 0.90 after chemotherapy, 0.90 before chemotherapy of the control group, and 0.90 after chemotherapy.

Vital Signs Follow-up Form: Blood pressure, pulse, respiration, and saturation (vital signs) by the researcher, who was a clinical nurse, were followed up and recorded in the vital signs follow-up form before starting the chemotherapy infusion and after the chemotherapy protocol was finished, in the intervention and control group consisting of 60 patients. Measurements were made from the patient's desired arm. The vital signs were measured because they affected the anxiety people experienced during chemotherapy. After the lack of information that fever is a vital sign affected by anxiety

in the literature review and the lack of fever monitoring in a similar[17], fever monitoring was not performed in practice. Omron brand M3 model sphygmomanometer supplied by the researcher was used to set a standard for vital signs measurement, and G-LIFE YK-81B finger type device was used for saturation and heart rate monitoring provided by the researcher.

Virtual Reality Glasses: The research used Samsung Gear VR SM-R323 brand and model SG glasses provided by the researcher. Patients were offered four different options to watch "Forest of Serenity," "Calm Place," "Happy Place," and "Gala 360 Travel & Relax". Forest of Serenity is a nature video consisting of bird sounds, colorful trees and flowers, and a clear lake where fish can be seen swimming. Calm Place is a relaxing video where cycles are shown 24 hours a day, where a person finds himself by the lake in the forest in snowy, rainy, sunny weather. In Happy Place, one is in a virtual camp environment where natural events such as dynamically changing weather, day-night cycles, and falling stars are experienced. Gala 360 Travel & Relax is a Paris-Notre Dame museum tour video.

After the patients were informed about the video content, they were asked which one they preferred to watch. The videos they chose for the intervention group during chemotherapy were watched through VR glasses. The patients' preferences were more in favor of nature videos. The most-watched videos were "Forest of Serenity," "Calm Place," and "Happy Place," respectively. The use of VR does not pose a safety risk for patients.

The Ethical Dimension of the Research

The permission of the ethics committee required for the conduct of the research was obtained from the Ethics Committee of Ankara Yıldırım Beyazıt University with the number 2019-438 dated 13.11.2019. The application permissions for the questionnaire and the scales used were obtained from the Chief Medical Office of the Oncology Hospital where the research was conducted.

Data Analysis

Statistical analyses were performed using the package program called SPSS (IBM SPSS Statistics 24). Frequency tables and descriptive statistics were used to interpret the findings. In accordance with parametric methods, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups, and the "ANOVA" test (F-table value) method was used to compare the measurement values of three or more independent groups. When comparing the measurement values of two dependent groups, the "Paired Sample-T" test (t-table value) method was used, and non-parametric methods were used for measurement values unsuitable for the normal distribution. In accordance with non-parametric methods, the "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of two independent groups, the "Kruskal-Wallis H" test (x^2- table value) was used to compare the measurement values of three independent or more groups. The "Wilcoxon" test (Z-table value) method was used to compare the measurement values of the two dependent groups. According to the expected value levels in the study of the relationship between two qualitative variables, the Fisher-Exact test and "Pearson x^2 cross tables" were used. A value of $p<0.05$ was considered statistically significant.

Results

The intervention group included in this study consists of 30 patients, 50% of whom are male and 50% female. Of these, 80% are married, and 96.7% have children. The majority of the intervention group, 33.33%, are between the ages of 56 - 65, and this group's average age was 58.80±13.22 (years). The study's control group consists of 50% male and 50% female patients, 76.7% of these 30-person control groups are married, and 86.7% have children. The majority of this group, 33.33%, consists of patients aged 56-65 years, and the average age was 59.07±13.08 (years).

Table 1. Pulse, respiration, blood pressure, and saturation values of the intervention and control groups before/after chemotherapy.

Vital Signs		Intervention Group (n=30) $\underline{X} \pm S.S.$	Control group (n=30) $\underline{X} \pm S.S.$	Statistical analysis* Possibility
Pulse	Before Chemotherapy	85.93±15.73 /min	87.33±16.05 /min	t=-0.341 p=0.734
	After Chemotherapy	78.53±15.38 /min	81.13±12.84 /min	t=-0.711 p=0.480
Statistical analysis Possibility		**t=5.154 p=0.000**	**t=3.962 p=0.000**	
Respiratory	Before Chemotherapy	20.40±1.52/min	20.00±2.10 /min	Z=-1.026 p=0.305
	After Chemotherapy	18.07±1.53/ min	19.87±1.89 /min	**Z=-3.591 p=0.000**
Statistical analysis Possibility		**Z=-4.636 p=0.000**	Z=-0.577 p=0.564	
Systolic BP	Before Chemotherapy	128.90±21.56 mmHg	127.33±18.32 mmHg	t=0.303 p=0.763
	After Chemotherapy	120.20±15.31 mmHg	123.00±18.54 mmHg	t=-0.638 p=0.526
Statistical analysis Possibility		**t=3.602 p=0.001**	t=2.039 p=0.051	
Diastolic BP	Before Chemotherapy	77.60±11.32 mmHg	80.27±11.09 mmHg	t=-0.922 p=0.361
	After Chemotherapy	74.77±11.90 mmHg	78.97±11.40 mHg	t=-1.396 p=0.168
Statistical analysis Possibility		t=1.865 p=0.072	t=0.717 p=0.479	
Saturation	Before Chemotherapy	%96.80±1.94	%96.23±2.33	Z=-0.876 p=0.381

	After Chemotherapy	%97.13±1.72	%95.10±2.14	Z=-3.507 p=0.000
Statistical analysis **Possibility**		**Z=-0.837** **p=0.402**	**Z=-2.837** **p=0.005**	

* In data with a normal distribution, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups; the "Paired Sample-t" test (t-table value) was used to compare the two dependent groups. The "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of the two independent groups in data that did not have a normal distribution; the "Wilcoxon" test (Z-table value) statistics were used to compare the two dependent groups.

According to the measurements conducted in the intervention group within the scope of the study, a statistically significant difference was found in terms of pulse, respiratory systolic blood pressure, and saturation values before chemotherapy and during chemotherapy after using VR glasses (T=5.154; p=0.000, Z=-4.636, p=0.000 t=3.602, p=0.001, t=1.865, p=0.072 Z=-0.837, p=0.402).

When the control group was examined, although there was a statistically significant difference in heart rate and saturation values (t=3.962; p=0.000, Z=-2.837; p=0.005) before chemotherapy, it was lower than the values of the intervention group. In addition, no statistically significant differences were found in the control group in terms of respiratory, systolic blood pressure, and diastolic blood pressure values (p>0.05).

The groups found no statistically significant difference in respiratory, systolic, and diastolic blood pressure and saturation values measured before chemotherapy (p>0.05). There was a statistically significant difference between the groups in terms of respiratory values measured after the chemotherapy (Z=-3.591; p=0.000). There was a statistically significant difference between the groups in terms of saturation values measured after the chemotherapy (Z=-3.507; p=0.000). Although there was no statistical significance in the saturation values measured before and after chemotherapy in the intervention group, it was determined to be higher after chemotherapy (p>0.05).

Table 2. Comparison of the state anxiety scale scores measured before and after chemotherapy treatment of the intervention and control group.

State anxiety inventory	Intervention Group (n=30) $\underline{X} \pm S.S.$	Control group (n=30) $\underline{X} \pm S.S.$	Statistical analysis* Possibility
Before Chemotherapy	39.03±10.14	41.76±9.24	t=-1.092 p=0.280
After Chemotherapy	30.60±8.20	39.70±8.82	**t=-4.140** **p=0.000**
Statistical analysis **Possibility**	**t=10.406** **p=0.000**	**t=2.518** **p=0.018**	

* In data with a normal distribution, the "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups; the "Paired Sample-t" test (t-table value) was used to compare the two dependent groups.

A statistically significant difference was found in the intervention group in terms of the state anxiety scale scores measured before chemotherapy and the scores measured after chemotherapy (t=10.406; p=0.000), and it was observed that the state anxiety scale scores measured after chemotherapy was found to be lower at a statistically significant level than the scores measured before chemotherapy.

In the control group, a statistically significant difference was found in the state anxiety scale scores measured before and after chemotherapy (t=2.518, p=0.018). It was observed that the state anxiety scale scores measured after chemotherapy were lower at a statistically significant level than those measured before chemotherapy (Table 2).

There was no statistically significant difference in the state anxiety scale scores measured before chemotherapy compared to the groups (p>0.05). However, a statistically significant difference was found between the groups in terms of the state anxiety scale scores measured after chemotherapy (t=-4.140; p=0.000), and the state anxiety scale scores measured after chemotherapy in the intervention group were found to be statistically significantly lower than in the control group.

Table 3. Comparison of the state anxiety scale scores according to the demographic characteristics of the intervention and control groups.

Variable	n	INTERVENTION GROUP		n	CONTROL GROUP	
		Before chemotherapy	**After chemotherapy**		**Before chemotherapy**	**After chemotherapy**
		State anxiety inventory			State anxiety inventory	
		$\bar{X} \pm S.S.$	$\bar{X} \pm S.S.$		$\bar{X} \pm S.S.$	$\bar{X} \pm S.S.$
Gender						
Female	15	39.87±12.14	31.13±9.45	15	44.07±5.80	41.20±6.81
Male	15	38.20±8.00	30.07±7.03	15	39.47±11.48	38.20±10.48
Statistical analysis*		t=0.444	t=0.351		t=1.385	t=0.930
Possibility		p=0.660	p=0.728		p=0.177	p=0.360
Marital Status						
Married	24	40.04±9.96	30.92±8.69	23	41.04±9.94	39.13±9.76
Single	6	35.00±8.22	29.33±6.31	7	44.14±4.41	41.57±4.58
Statistical analysis*		t=1.094	t=0.417		t=-0.722	t=-0.635
Possibility		p=0.283	p=0.680		p=0.447	p=0.531
Education level						
Elem.x and under	18	39.06±9.99	29.33±7.51	18	43.00±8.72	41.56±8.43
Secondary school	6	40.67±9.97	34.33±9.35	6	43.83±9.30	39.83±8.68
U. x and above	6	37.33±8.47	30.67±9.40	6	36.00±9.96	34.00±9.08
Statistical analysis*		F=0.153	χ²=1.330		F=1.534	F=1.737
Possibility		p=0.859	p=0.514		p=0.234	p=0.195
Profession						
Retired	19	38.68±10.47	30.21±8.50	12	42.67±11.16	43.0 [12.5]
Other	11	39.64±10.00	31.27±8.00	18	41.17±8.00	39.5 [10.8]
Statistical analysis*		t=-0.244	t=1.319		t=0.429	t=0.610
Possibility		p=0.809	p=0.198		p=0.671	p=0.547

Income Status						
Income<Expenditure	17	38.18±9.45	29.65±7.92	13	42.85±9.65	41.46±9.39
Income>Expenditure	13	40.15±9.95	31.85±8.70	17	40.94±9.12	38.35±8.39
Statistical analysis*		t=-0.523	Z=-0.670		t=0.553	t=0.956
Possibility		p=0.605	p=0.503		p=0.585	p=0.347
The stage of the disease						
1st	11	40.91±12.04	31.36±8.43	5	35.60±9.56	35.60±8.47
2nd	12	39.42±9.48	31.83±9.22	12	43.33±6.58	41.67±6.30
3rd	7	35.43±5.59	27.29±5.79	13	42.69±10.81	39.46±10.80
Accompanying disease						
Statistical analysis*		F=0.623	F=0.742		F=1.388	F=0.834
Possibility		p=0.544	p=0.486		p=0.267	p=0.445
None	17	37.76±11.63	29.24±8.88	18	39.89±8.67	37.44±8.21
One disease	7	41.57±9.47	31.86±8.43	7	44.43±11.90	42.00±10.69
Two diseases	6	39.67±6.38	33.00±6.07	5	44.80±6.87	44.60±6.58
Statistical analysis*		F=3.196	χ²=1.936		F=0.927	F=1.674
Possibility		p=0.057	p=0.380		p=0.408	p=0.206
Health Status						
Bad/medium	11	42.55±10.37	33.09±7.37	10	44.30±9.44	41.30±10.00
Good	19	37.00±9.69	29.16±8.49	20	40.50±9.11	38.90±8.32
Statistical analysis*		t=1.473	Z=-1.594		t=1.064	t=0.697
Possibility		p=0.152	p=0.111		p=0.296	p=0.492

* "Independent Sample-t" test (t-table value) was used to compare the measurement values of two independent groups in data with normal distribution; the "Mann-Whitney U" test (Z-table value) was used to compare the measurement values of two independent groups in data without normal distribution. "ANOVA" test (F-table value) was used to compare the measurement values of three or more independent groups in the data with normal distribution; "Kruskal-Wallis H" test (χ^2-table value) statistics were used to compare the measurement values of three or more independent groups without normal distribution. ˣElem: Elementary U.: University

In the intervention group, there was no statistically significant difference in pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, accompanying disease, and health status (p>0.05).

In the control group, which is the other study group, there was no statistically significant difference in pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, and health status (p>0.05) (Table 3).

Discussion

This study examined the effects of virtual reality glasses on the anxiety status and vital signs of patients receiving chemotherapy. As a result of the research, it was found that VR glasses have differences observed across the groups on vital signs and reduce the level of state anxiety. In a world where the number of cancer patients is increasing daily, it

should be possible to use VR glasses in clinics, since it is thought that the use of proven VR glasses will impact the quality of life of individuals with cancer. The results show that the study is remarkable.

When the pulse values in the sample group consisting of sixty (60) patients who received chemotherapy for the first time were examined, a statistically significant decrease was found between before and after chemotherapy in both the intervention group and the control group. However, while the difference in the reduction in pulse values before and after chemotherapy was lower in the control group, the difference in the decrease in pulse values in the intervention group was statistically significantly higher. In the intervention group, t=5.154; p=0.000 values were obtained statistically in terms of pulse values according to the first measured value after using VR glasses (Table 1). These values suggest that watching relaxing videos using VR glasses during chemotherapy treatment effectively reduces pulse values. In one study, the differences between pulse rates were statistically significant in the progressive muscle relaxation and VR groups[18]. These findings in the literature and related to the pulse values obtained in our study are parallel. A low pulse rate is also important as it indicates that the patient remains calm.

When the respiration values measured before and after chemotherapy of the patients who participated in the research were examined; it was found that the respiration values measured after chemotherapy in the intervention group, in which relaxing videos were watched using VR glasses, were found to be significantly lower than the respiratory values measured in the control group. It was observed that the calculated respiration rates of those in the intervention group after chemotherapy were significantly lower than before (Z=-4.636; p=0.000) (Table 1). In the literature review, there has been no research on the effects of VR glasses during chemotherapy on respiration rate. However, in a study of patients with prostate biopsy and port catheter implantation, there was a decrease in respiratory[19,20]. As a result, it can be concluded that the decrease in respiration values with the application of glasses leads to a change in the desired direction in patients' anxiety and concern levels. This is ultimately a good situation in terms of patient care.

When the systolic blood pressure values were examined, it was determined that the systolic blood pressure values after chemotherapy were significantly lower in the intervention group compared to the systolic blood pressure values measured before chemotherapy. Chirico et al. (2020), in their study examining the effect of music therapy and VR application on chemotherapy patients in reducing anxiety, stated that both methods were effective, but the VR application was more effective[21]. In addition, a decrease in systolic blood pressure was observed due to VR application in two different studies[19,20]. Based on this information, the difference in systolic blood pressure values results is likely to be related to the fact that the VR application is more effective.

When diastolic blood pressure values were examined, there was no significant change in diastolic blood pressure values before and after chemotherapy in both the intervention and the control group (p>0.05) (Table 1). No study in the literature examines the effects of VR application on the diastolic blood pressure of chemotherapy patients with whom we can compare this finding. One a study, VR application didn't significantly reduce pain and stress during the chemotherapy[22]. However, Brown et al. (2013), in their study on

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the stress perception of the environment in which people are under stress, observed that exposing patients to the image of nature during stress[23]. The results obtained in these studies are in line with the results obtained in this study. In other studies, a decrease in diastolic blood pressure was observed due to VR application[19,20]. In another study, the differences between blood pressure were statistically significant in the progressive muscle relaxation and VR groups[18]. It is thought that the different results related to blood pressure may be because the related variable is affected by other factors.

When the saturation values were examined, when the values before and after chemotherapy were compared in the intervention group, an increase was observed in the saturation values after the intervention, although it was not statistically significant. In the control group, a decrease in the saturation values after chemotherapy compared to before (Z=-2.837; p=0.005) suggests that VR application may have differences observed across the group despite the saturation value (Table 1). Studies with different patient groups also support our results[19,20]. In this regard, this study results are pleasing.

When the measurements before and after chemotherapy were evaluated; a statistically significant difference was found between the groups in terms of the state anxiety scale scores measured after chemotherapy (t=-4.140; p=0.000), and it was determined that the state anxiety scale scores measured after chemotherapy in the intervention group were significantly lower than in the control group. The post-chemotherapy state anxiety scale scores of both groups were found to be significantly lower than before chemotherapy. However, it is seen that this decrease is more in the intervention group (intervention group t=10.406; p=0.000 - control group t=2.518; p=0.018) (Table 2). The decrease in anxiety levels in the control group may be related to the relief experienced due to the end of chemotherapy. The fact that the decrease in the intervention group was greater compared to the control group may be related to the positive effect of the VR glasses application. These findings suggest that watching the relaxing images that the intervention group voluntarily prefers with VR glasses can effectively reduce the anxiety that patients experience intensely during the first chemotherapy session. When a literature review is performed, it is found that watching comforting images of patients receiving chemotherapy treatment using VR glasses reduces anxiety and that patients feel happier[18,19-21,23].

According to Gerçeker's study, VR is an effective distraction method in reducing port needle-related pain, fear, and anxiety in Pediatric Hematology-Oncology patients[24]. Chirico et al. (2020), in their study investigating the effects of VR application and music therapy on anxiety levels and people's emotional states in 94 chemotherapy patients, determined that both distraction practices reduce anxiety and positively affect people's emotional states. It has also been noted that VR application is more effective than music therapy in reducing anxiety and regulating mood[21].

In a randomized controlled study conducted by Mohammad and Ahmad (2019) with 80 breast cancer patients in Jordan, the effect of watching videos about sitting on the beach and deep-sea diving using VR glasses on the state of anxiety in chemotherapy patients was studied. It has been observed that using VR glasses administered in combination with morphine significantly reduces anxiety scores compared to morphine alone[25]. Espinoza et al. (2012) reported that watching fun and relaxing images with the help of

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VR glasses for 33 cancer patients between the ages of 41-85 reduces stress levels and increases happiness levels by reducing negative emotions[26]. In a study conducted by Banos et al. (2011), they investigated how VR technology affects the moods of 19 metastatic cancer patients aged between 29-85 who were hospitalized; they observed that entertaining and relaxing images watched with VR increase the positive emotions of the patients and decrease their negative emotions[27]. Similarly, another study determined that the application of VR glasses decreased the anxiety scores of patients with gynecological cancer in the preoperative period[28].

As a result, considering that patients experience intense anxiety due to the impact of the situation caused by uncertainties during the first chemotherapy session, it can be said that the decrease in the level of anxiety caused by the use of VR glasses is quite pleasing promising. In this context, it is thought that these practices that accompany the care will have good results for the wellbeing of the patients.

It was determined that there was no statistically significant difference in the pre-chemotherapy state anxiety scale scores and post-chemotherapy state anxiety scale scores according to gender, marital status, education level, occupation, income level, disease stage, accompanying disease, and health status in the intervention and control groups (Table 3). It can be concluded from this conclusion that sociodemographic characteristics do not primarily affect the level of anxiety.

Conclusion

These preliminary findings support using VR in clinical oncology settings to improve patients' anxiety. For example, it was observed that the intervention group and control group consisting of thirty patients had differences observed across the groups in pulse rate, respiratory rate, systolic blood pressure values, an increase in saturation values, and a significant improvement in the level of state anxiety.

The influence of age, sex, and treatment differences should continue to be examined to support recommendations regarding patients' suitability for VR interventions. In line with these results, it is recommended the use of virtual reality glasses with different age groups and videos, examination of the effect on other symptoms (such as fatigue and nausea-vomiting), application of it in ongoing chemotherapy sessions, and to inform, especially oncology nurses, and all nurses working with chronic patients about the use of virtual reality glasses.

Limitations of the Study: The sample can't be randomized.

Credit Authorship Contribution Statement

SO: Conceptualization, Data curation, Writing, Investigation.

BI: Software, Methodology, Visualization, Supervision,

Declaration of Competing Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this study.

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The Effect of Pomegranate (Punica granatum L.) Peel and Juice Addition to Bread Varieties on In Vitro Estimated Glycemic Index, Hydrolysis Index and Sensory Properties[*]

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Abstract

Aim: This study aims to compare the effect of enrichment of white and whole wheat breads with pomegranate peel (PP) and pomegranate juice (PJ) on glycemic index (GI), hydrolysis index (HI) and sensory properties of bread with standard white bread in line with sustainable nutrition approach.

Method: Six different samples were prepared by adding PP and PJ to bread: (1.) White Bread (100 g), (2.) White Bread (95 g) + PP (5 g), (3.) White Bread (90 g) + PP (5 g) + PJ (110 g), (4.) Whole Wheat Bread (100 g), (5.) Whole Wheat Bread (95 g) + PP (5 g) and (6.) Whole Wheat Bread (90 g) + PP (5 g) + PJ (110 g). The HI value of the test food was calculated by comparing it to the reference food. The estimated GI analyses of the samples were performed by spectrophotometric-based methods under *in vitro* conditions. Afterwards, sensory analyses such as color, smell, taste etc. of these samples were evaluated by 11 panelists and the data obtained were analyzed with SPSS package program.

Results: The estimated GI values of the samples showed a non-significant decrease compared to standard white bread (p>0.05). Whole wheat bread with added PP was found to have the lowest GI among the samples (84.5 ± 0.5). The HI (88.4 ± 1.0) of whole wheat bread with PP and PJ was statistically lower than the HI (100.0 ± 1.2) of standard white bread, but higher than the HI (84.5 ± 0.5) of whole wheat bread with only PP. As a result of sensory analysis, significant results were obtained only for sourness (p=0.014) and hardness (p=0.011) parameters of whole wheat bread. Whole wheat bread with added PP was the most liked and most suitable for consumption (4.10 ± 0.70) (p>0.05).

Conclusion: Whole wheat bread with PP had lower *in vitro* estimated glycemic index and was the most liked bread in terms of sensory properties.

Keywords: Sustainability, pomegranate peel, glycemic index, hydrolyzed index, bread.

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Ekmek Çeşitlerine Nar (*Punica granatum* L.) Kabuğu ve Suyu İlavesinin *İn Vitro* Tahmini Glisemik İndeks, Hidroliz İndeksi ve Duyusal Özellikler Üzerine Etkisi

Öz

Amaç: Bu çalışma, sürdürülebilir beslenme yaklaşımı doğrultusunda, beyaz ve tam buğday ekmeğinin nar kabuğu (NK) ve nar suyu (NS) ile zenginleştirilmesini; glisemik indeks (GI) ve hidroliz indeksinin (HI) standart beyaz ekmeğe kıyasla azaltılmasını ve ekmeğin duyusal özelliklerinin değerlendirilmesini amaçlamaktadır.

Yöntem: Ekmeğe NK ve NS eklenerek 6 farklı numune hazırlanmıştır: (1) Beyaz Ekmek (100 g), (2) Beyaz Ekmek (95 g) + NK (5 g), (3) Beyaz Ekmek (90 g) + NK (5 g) + NS (110 g), (4) Tam Buğday Ekmeği (100 g), (5) Tam Buğday Ekmeği (95 g) + NK (5 g) ve (6) Tam Buğday Ekmeği (90 g) + NK (5 g) + NS (110 g). Test besinin HI değeri referans besin ile karşılaştırılarak hesaplanmıştır. Numunelerin tahmini GI analizleri *in vitro* koşullarda spektrofotometrik temelli yöntemlerle gerçekleştirilmiştir. Daha sonra bu numunelerin renk koku tat vb. duyusal analizleri 11 panelist tarafından değerlendirilmiş ve elde edilen veriler, SPSS paket programı ile analiz edilmiştir.

Bulgular: Çalışmada kullanılan numunelerin tahmini GI değerleri standart beyaz ekmeğe kıyasla anlamlı olmayan bir düşüş göstermiştir (p>0,05). Nar kabuğu eklenmiş tam buğday ekmeğin numuneler arasında en düşük GI'e sahip olduğu görülmüştür (84,5 ± 0,5). NK ve NS eklenmiş tam buğday ekmeğinin HI (88,4 ± 1,0) değeri, standart beyaz ekmeğin HI (100,0 ± 1,2) değerinden istatistiksel olarak daha düşük bulunmuş, ancak yalnızca NK eklenmiş tam buğday ekmeğinin HI (84,5 ± 0,5) değerinden daha yüksek olduğu saptanmıştır. Duyusal analiz sonucunda yalnızca tam buğday ekmeğinin ekşilik (p=0,014) ve sertlik (p=0,011) parametrelerinde anlamlı sonuçlar elde edilmiştir. En çok beğenilen ve tüketim açısından en uygun bulunan ekmeğin, NK eklenen tam buğday ekmeği olduğu belirlenmiştir (4,10 ± 0,70) (p>0,05).

Sonuç: Nar kabuğu eklenen tam buğday ekmeğinin *in vitro* tahmini glisemik indeksinin daha düşük ve duyusal özellikler açısından en çok beğenilen ekmek olduğu belirlenmiştir.

Anahtar Sözcükler: Sürdürülebilirlik, nar kabuğu, glisemik indeks, hidrolize indeks, ekmek.

Introduction

Sustainable nutrition is crucial for global development, protecting biodiversity, and delivering natural food resources. The processing of fruits and vegetables leaves excessive waste by-products such as peel, seeds, and pulp[1]. The Food and Agriculture Organization (FAO) aims to reduce food waste by 50% by using food by-products as materials[2]. The use of food by-products, rich in nutrients and bioactive compounds, is being explored for their health benefits. While they may increase glycemic index, it's crucial to evaluate their palatability and consumer acceptance[3].

Pomegranate (*Punica granatum* L.) is a member of the Punicaceae family, of which Türkiye is one of the leading countries in production. During industrial processing, 50% of the pomegranate fruit is discarded as peel, pulp, and seeds[4]. Pomegranate is rich in bioactive components and antioxidants[5] making it valuable in supplements and medicine for its potential disease-protective effects[6].

Pomegranate peel, despite being a by-product, contains bioactive components that can be used to create high-nutrient food products[7,8]. The phenolic acids in the peel, which make up about half of the fruit, have antioxidant and anti-inflammatory properties[9].

The Glycemic Index (GI) classifies carbohydrate-rich foods, helping people make appropriate choices for their health. The glycemic response of a food depends on the number of components present in it, such as dietary fiber, protein, and fat[10]. High-glycemic carbohydrates have a GI value over 70[11]. The Hydrolyzed Index (HI) measures

the speed of carbohydrate digestion in the gastrointestinal tract, with high HI often indicating rapid absorption and breakdown of carbohydrates[12]. The GI measures the rate at which a carbohydrate-containing food raises blood glucose levels, while the hygroscopic index (HI) evaluates the breakdown of carbohydrates during digestion[10]. Foods with a high HI often correspond to high GI values, indicating rapid digestion and absorption, leading to spikes in blood glucose levels[13]. The modulation of glycemic levels and the regulation of cellular glucose uptake are crucial elements in preserving health[14]. Hyperglycemia has been demonstrated to induce reactive oxygen species (ROS) production, thereby accentuating the interconnection between hyperglycemia, oxidative stress, and inflammation. This interplay has been evidenced to precipitate a spectrum of metabolic disorders affecting the liver, adipose tissue, skeletal muscle, kidneys, cardiovascular system, retina, and other organs[15].

Food compounds such as polyphenols, flavonoids, and tannins are suggested as natural α-amylase and α-glucosidase inhibitors to regulate dietary glucose metabolism, as blood glucose is primarily derived from dietary carbohydrate hydrolysis[16]. White bread, the primary carbohydrate source consumed in Türkiye is a high-GI product that undergoes rapid digestion and absorption, and its lack of glycemic control can contribute to elevated blood sugar levels[17,18]. It has been shown that polyphenols can inhibit the activity of *in vitro* amylolytic enzymes and control GI[19]. In the literature, pomegranate juice (PJ) has also been found to be effective in the prevention of type 2 diabetes by showing hypoglycemic activity and antidiabetic effect. The hypoglycemic and antidiabetic effects of PJ are primarily attributed to its rich content of bioactive compounds, particularly polyphenols such as ellagitannins, ellagic acid, and flavonoids[20].

In addition, another strategy to reduce the GI of bread is incorporating fiber-rich flours or pure dietary fiber[21]. The most abundant component in pomegranate peel (PP) is dietary fiber, which can range from 33% to 62%, making PP a natural and rich source of fiber[22]. It is believed that incorporating PP into breads may influence glycemic response by increasing their fiber content and antioxidant capacity, while the inclusion of PJ could further enhance these effects. This study aims to assess the impact of enriching white and whole wheat breads with PP and PJ on the *in vitro* estimated glycemic index (eGI), HI and sensory properties of these breads, comparing them with standard white bread, within the context of sustainable nutrition.

Material and Methods

Preparation of Samples

Wheat flour (Type 750) (0.75% ash, 10.5% protein, and 14.5% moisture), whole wheat flour (1.2% ash, 11% protein and 14.5% moisture), fresh yeast, salt, drinking water, olive oil, pomegranate peel (PP) and pomegranate juice (PJ) were used as ingredients in this study. No preservatives were added. Breads were made with Russell Hobbs 18036-56 RH Classic Bread Making Machine.

Pomegranates (*Punica granatum* L.) were obtained from the local market. After pomegranates were washed and they were pressed with a juicer to obtain pomegranate juice. After being filled into 1 L glass bottles, they were tightly closed and stored at -18°C. The peels of the same pomegranates were cut into small pieces and divided into small

containers made of aluminum foil. They were dried in a sterilization device (Megaterm M160 16 Lt Manual Dry Air Sterilizer) at 50 °C for about 6 h. The dried pomegranates were grinded and stored at 0-4°C.

The mixture of pomegranate juice (110 g) was added as a substitute for water, and pomegranate peel powder (5 g) was added to the bread dough mixture as a substitute for flour in the following amounts according to the ratios used in the reference studies[23,24]. The visuals of the samples listed below are given in Figure 1 and the content of bread samples are shown in Table 1.

Table 1. Content of Bread Samples with Pomegranate Peel (PP) and Pomegranate Juice (PJ)

Sample type	Weight (g)	Pomegranate Peel (PP) (g)	Pomegranate Juice (PJ) (g)
White Bread	100	0	0
White Bread + PP (5 g)	95	5	0
White Bread + PP (5 g) + PJ (110 g)	90	5	110
Whole Wheat Bread	100	0	0
Whole Wheat Bread + PP (5 g)	95	5	0
Whole Wheat Bread + PP (5 g) + PJ (110 g)	90	5	110

Figure 1. Bread samples used in the study

In Vitro Estimated Glycemic Index

For the *in vitro* estimated GI (eGI) method, the analytical methods of Englyst et al. (1999)[25] and Gibson et al. (2011)[26] were used as references. The data obtained in these studies were calculated according to a study by Goni et al. (1997)[27].

For eGI determination, approximately 1 g sample was weighed into a 50 ml tube and 0.1M phosphate buffer (pH 6.9) was added and mixed thoroughly in vortex. Then 20 ml of phosphate buffer was added. The pH of the mixture was adjusted to 2.5 with orthophosphoric acid and 1 ml of pepsin enzyme was added. The mixture was kept in a shaking water bath at 37°C for 1 hour and pH was adjusted to 6.8 with potassium hydroxide solution. 2 mL alpha amylase enzyme was added. The prepared solution was transferred into a dialysis tube and taken for 500 ml of buffer solution. From the solution in the shaking water bath, 0.2 ml was taken at 0, 15, 30, 45, 60, 90, 120 minutes, the solution was treated with the D-Glucose assay kit (GOPOD) solution, and the amount of glucose was calculated, and the starch amount was determined by multiplying the result by 0.9.

The values obtained were compared with total starch and the % soluble starch content was also found. White bread as a reference food was processed in the same way. The area under the reference food was accepted as 100.

In Vitro Hydrolysis Index

The HI value of the test food was calculated by comparing it to the reference food. The HI value of white bread was accepted as 70. In the calculation, the HI values of other tested foods were multiplied by 0.7[27]. The *in vitro* GI value of foods was calculated according to the following formula:

HI = Area (test food) / Area (reference food) x 100

eGI = 39,71 + 0,549 x HI

Sensory Analysis of Samples

Sensory analysis of the samples was carried out in May 2023 with 11 individuals aged 18-65 years, who volunteered to participate in the study. Individuals with food allergies, colds or flu, recent cases of SARS-CoV-2 infection, impaired taste and smell, and smokers were excluded from participation. The prepared samples were evaluated by the panelists using a single-blind method, whereby the assessors were unaware of the identity of the samples.

Analyses were carried out according to the paired comparison method. A questionnaire form with a scoring scale was used. The panelists tasted the samples and gave a score from 1 to 5 (very good, good, undecided, poor, and very poor) in the sensory analysis questionnaire. In the questionnaire, viscosity, consistency, color, smell, taste, texture and general acceptability criteria of the products were scored by Likert method. The arithmetic mean of the scores for each attribute was taken to calculate the general acceptability score. Panelists were asked to neutralize the taste with water before tasting each sample.

This study was approved ethically by the Marmara University Faculty of Health Sciences Non-Invasive Clinical Studies Ethics Committee (No: 2022/180) and the research was conducted following the principles stated in the Helsinki Declaration. Informed Consent Form was signed by all participants before sensory analysis.

Statistical Analysis

The data obtained from this study was analyzed with Statistical Package for the Social Sciences (SPSS) 28.0 statistical software. The difference between the samples was determined by ANOVA test and Tukey post-hoc test was used for two group comparisons. Data were expressed as mean ± standard deviation. For all analyses, p value < 0.05 was considered statistically significant.

Results

In this study, the HI and eGI of seven samples were calculated, including a standard white bread sample that was used as a reference (Table 2). Although no significant decrease was observed among the white bread samples, it was found that the addition of PP to whole wheat bread decreased the HI values significantly (p < 0.05). The sample with the lowest eGI value among all samples was PP added whole wheat bread (60.3 ± 1.1). Similarly, when the HI values were analyzed, the PP added whole wheat bread had the lowest HI value (84.5 ± 0.5). It was found that the HI (88.4 ± 1.0) value of PP and PJ added whole wheat bread was statistically lower than the HI (100.0 ± 1.2) value of standard white bread, but higher than only PP added whole wheat bread.

Table 2. Calculated hydrolysis index and estimated glycemic index for breads

Sample	HI[1] ± SD (%)	eGI[1] ± SD (%)
Standard White Bread	100.0 ± 1.2[a]	66.3 ± 1.1[a]
White Bread	92.4 ± 0.8[b]	63.3 ± 0.6[ab]
Whole Wheat Bread	89.6 ± 1.1[c]	62.2 ± 2.0[b]
White Bread + PP	99.7 ± 0.9[a]	66.1 ± 1.0[a]
Whole Wheat Bread + PP	84.5 ± 0.5[d]	60.3 ± 1.1[b]
White Bread + PP + PJ	98.6 ± 0.5[a]	65.7 ± 1.0[a]
Whole Wheat Bread + PP + PJ	88.4 ± 1.0[c]	61.8 ± 0.6[b]

HI - hydrolysis index; eGI - estimated glycemic index; PP - Pomegranate Peel; PJ - Pomegranate Juice

[1] The different letters in the same column indicate that there are statistical differences between the values (ANOVA p < 0.05. Tukey's test).

Figure 2 shows the starch release as a result of *in vitro* eGI determination. According to the graph, it is seen that whole wheat breads show a more balanced release compared to white breads. PP added whole wheat bread showed the lowest starch release (0,222) at the end of the 30th minute. PP and PJ added whole wheat bread showed the lowest starch release (0.329) at the end of 60 minutes. Only PP added whole wheat bread showed the lowest starch release (0.598) at the end of the 180th minute.

Fig 2. *In vitro* starch digestion
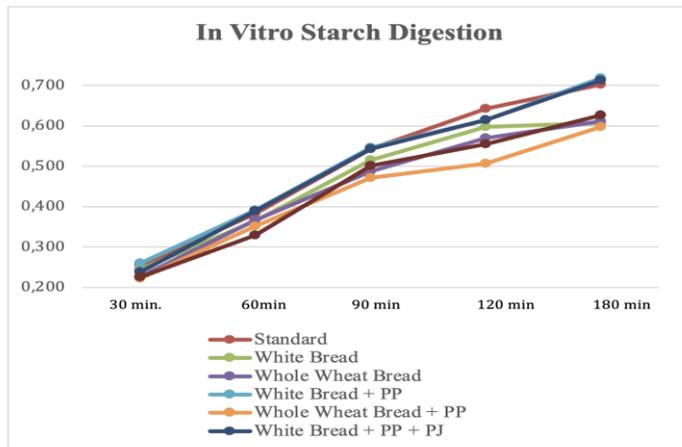
To evaluate the sensory analyses of the bread samples, a total of 11 panelists were included in the study. Of these, 90.9% (n=10) were female and 9.1% (n=1) was male. The average age of the panelists was 33.5 ± 2.73 years.

Sensory analysis results of bread samples are shown in Table 3. A statistically significant difference was found in the sourness parameter of the bread samples (p = 0.014). White bread (4.00 ± 0.77) was statistically more favored. With the addition of PP to whole wheat bread, although the liking of sourness did not change statistically, it increased and became numerically the closest sample to plain white bread. The degree of sourness of PP and PJ added whole wheat bread (2.64 ± 1.43) was found to be statistically less favorable than the others (respectively; p=0.014 and p=0.011).

A statistically significant difference was found in the hardness parameter of bread samples (p = 0.011). Plain white bread (4.19 ± 0.60) was statistically most liked. The closest score to plain white bread was found to be PP and PJ added whole wheat bread (4.00 ± 0.89).

No statistically significant difference was found in the general acceptance parameter of the bread samples (p= 0.159). When the general acceptance criterion was evaluated, whole wheat bread enriched with PP achieved the highest preference score (4.10 ± 0.70) among the samples, though the difference was not statistically significant (p > 0.05).

Table 3. Sensory analysis results of bread samples

Sensory characteristics	Bread samples						*p* value
	White Bread	Whole Wheat Bread	White Bread + PP	Whole Wheat Bread + PP	White Bread + PP + PJ	Whole Wheat Bread + PP + PJ	
Viscosity	3.82 ± 0.75	3.73 ± 0.79	4.10 ± 0.54	3.91 ± 0.83	3.82 ± 0.75	3.91 ± 0.70	0.910
Consistency	4.00 ± 0.63	3.55 ± 0.93	4.10 ± 0.54	4.00 ± 0.63	3.91 ± 0.54	3.91 ± 0.54	0.668

Smell	4.00 ± 0.89	3.64 ± 0.67	3.73 ± 1.01	4.00 ± 1.10	3.55 ± 0.82	3.37 ± 1.36	0.557
Taste	3.64 ± 0.50	3.64 ± 1.21	3.00 ± 1.18	3.82 ± 1.40	3.00 ± 1.18	3.19 ± 1.25	0.335
Sourness	4.00[a]± 0.77	3.73[ab]± 0.65	2.82[b] ±1.25	3.91[a] ± 1.04	2.82[b]±1.25	2.64[b]±1.43	**0.014**
Tissue	3.91 ± 0.83	3.73 ± 0.79	3.64 ± 0.81	3.91 ± 0.94	3.64 ± 0.81	4.10 ± 0.70	0.698
Hardness	4.19[a]± 0.60	3.73[ab]± 0.65	3.19[b]±0.98	3.19[a]± 0.60	3.19[b]±0.98	4.00[a]±0.89	**0.011**
Pore structure	4.00 ± 0.63	3.73 ± 0.79	4.19 ± 0.60	3.73 ± 0.90	4.10 ± 0.83	3.73 ± 0.79	0.636
Shell color	3.82 ± 0.75	4.00 ± 1.00	3.55 ± 0.69	4.19 ± 0.75	3.91 ± 0.83	4.19 ± 0.40	0.289
Interior Color	4.28 ± 0.90	4.00 ± 0.63	4.00 ± 0.89	4.10 ± 0.83	4.10 ± 0.70	4.00 ± 0.63	0.859
General acceptance	3.73 ± 0.90	3.64 ± 0.81	3.19 ± 0.98	4.10 ± 0.70	3.19 ± 0.98	3.37 ± 1.03	0.159

PP - Pomegranate Peel; PJ - Pomegranate Juice

[1]The different letters in the same rows indicate that there are statistical differences between the values (ANOVA $p < 0.05$. Tukey's test)

Discussion

This study was conducted to enrich white and whole wheat bread with the peel and juice of pomegranate fruit within the scope of sustainable nutrition and to calculate the eGI and HI compared to standard white bread. Among the breads, the PP added whole wheat bread was found to have the lowest eGI. Also, the sensory analysis showed that the PP added whole wheat bread was the sample with the highest score, according to the general acceptance criterion.

Dietary fiber, a type of slowly digestible carbohydrate, has a low GI and plays a major role in improving public health[28]. The International Carbohydrate Quality Consortium panel has endorsed low GI as an effective approach to reduce postprandial glycemic response[29]. In studies examining the use of PP, it has been observed that the inclusion of PP in cookies and biscuits[30-32], breads[33-37] and cakes[38] has resulted in an increase in dietary fiber, phenols and antioxidant activity. Dietary fiber delays carbohydrate absorption, which helps to prevent increases in insulin levels, improve glycemic control, and reduce the GI of foods[39]. In a study by Garcia et al. (2023)[40], the GI value of the control bread was accepted as 100, the GI value for bread with 2.5% PP was 78 and the GI value for bread with 5% PP was 72 and a statistically significant difference was found. In this study, the eGI of white bread enriched with 5% PP was higher than the control bread, whereas the eGI of whole wheat bread enriched with 5% PP was lower than plain whole wheat bread. These findings suggest that the addition of PP to bread formulations

may alter the glycemic response depending on the composition and properties of the bread.

Mirab et al. (2020)[41] produced sponge cake using PP (0.5, 1 and 1.5 g/100 g) and evaluated α-glucosidase and α-amylase activities. As a result of the study, starch digestibility and glycemic index in sponge cake decreased by 43.5% and 44%, respectively. Similarly, in our study, a decrease in starch release was observed in whole wheat bread with PP and a decrease in eGI value was determined.

Pomegranate Juice has shown to have decreasing effects on acute and 3 h postprandial glycemic effect in both healthy and diabetic individuals[42,43]. In a previous study, the reduced glycemic response after consumption of PJ-added bread was explained by the fact that polyphenols derived from pomegranate have the potential to further modulate carbohydrate metabolism[44]. However, in contrast to previous clinical studies, in this study, the addition of PJ in addition to PP made no significant difference on eGI in bread samples. This difference between *in vitro* eGI and clinical studies suggests that PJ may increase the glycemic index of bread due to its low fiber and simple carbohydrate content, but the polyphenol and other antioxidant components present in PJ may reduce the glycemic response by affecting glucose metabolism. In a recent study where pomegranate peel powder (8% PP) was added to muffins, the total phenols increased from 0.92 to 12.5 mg GAE/100 g, total tannins from 0.2 to 8.27 mg GAE/100 g, and an increase in *in vitro* antioxidant activity was observed. Further *in vivo* studies are needed to determine the effects of polyphenols and antioxidants on the glycemic index of the breads.[45]

Although studies show that PP in bakery products ranges from 1% to 20%[30-38], studies have shown that 2.5% to 5% PP added to bread is acceptable to consumers[34,35,40]. Ismail et al. (2014)[30] reported that enrichment of cookies with PP remained acceptable below 6%, but the overall acceptance significantly reduced when the added PP increased. In our study, the highest overall acceptability was found in whole wheat bread with 5% PP. Although the addition of PP to white bread led to a decrease in the overall acceptance criterion, the scores of all samples were statistically similar. The reason for no significant difference in the overall acceptability level of the addition of PP and PJ to the breads, may be the slightly sour taste and dark color from the additions of PP and PJ are similar to the traditional Turkish breads.

Bread texture, particularly hardness, can be influenced by the addition of functional ingredients such as PP. Bourekoua et al. (2018)[46] reported that the samples with higher addition of pomegranate seed powder were harder. In this study, PP added white bread, and PP and PJ added white bread were rated lower in hardness parameter compared to plain white bread in accordance with the study conducted by Bourekoua et al. (2018).[46] In contrast, in our study, PP added whole wheat bread and PJ and PP added whole wheat bread were rated higher in terms of hardness than plain whole wheat bread. This may be since plain white bread is softer than plain whole wheat bread.

Pomegranate peel, in addition to its use in bakery products, serves as a natural antioxidant and biopreservative in dairy, meat, poultry, and fish products due to its high phenolic content. It can replace synthetic preservatives and enhance the antioxidant properties of packaging materials.[47] A study by Giri et al.[45] suggests that PP powder can effectively substitute chemical preservatives in muffins, although it may impart a slightly

bitter taste. In our study, the addition of PP to white bread did not affect the sourness score in sensory analysis. Furthermore, the addition of pomegranate peel's soluble dietary fiber to sweet potato starch has been shown to reduce its digestibility and increase resistant starch content, which may help reduce the glycemic response of starch-based foods.[48]

In other research, by-products such as grape pomace and pecan shells were added to bread at varying ratios, demonstrating a reduction in the GI compared to control bread.[49] Similarly, a study on Picralima nitida fruit found that the whole fruit powder exhibited the lowest estimated glycemic load (eGL), further supporting the potential of fruit by-products as effective antidiabetic food additives.[50] In this study, the addition of pomegranate peel and juice to whole wheat bread appears to be more effective in reducing the eGI. These findings highlight the value of using fruit by-products in enhancing both the nutritional quality and health benefits of food.

Strengths and Limitations

The study provides a comprehensive analysis by integrating *in vitro* eGI analysis and sensory evaluations to examine the effects of PP and PJ on bread. It highlights the influence of different bread formulations (white, whole wheat, and PP/PJ-added) on the eGI and HI, providing valuable insights into how pomegranate derivatives affect the nutritional profile of bread. Sensory evaluations, including assessments of taste, color, and texture conducted by trained panelists, offer critical information on consumer preferences. Finally, the study contributes to sustainability by utilizing PP and PJ to reduce food waste while enhancing the nutritional value of bread. This approach promotes the efficient use of environmental resources and supports the development of functional foods that are both health-beneficial and environmentally friendly.

However, the study has some limitations. While the eGI reduction effect was evaluated through the incorporation of PP powder, the analysis of fiber content in the final bread products was not conducted. Also, the addition of PP altered the expected soft texture of the bread, and the absence of a nutritional analysis of the pomegranates used constitutes another limitation. Despite these limitations, the findings underscore the potential health benefits of incorporating natural by-products, such as PP, into bread products, and highlight the need for further research to explore the integration of such ingredients in food systems.

Conclusion

Non-consumed dietary fiber sources such as PP can be functionally effective and can be utilized. In this study, whole wheat bread with PP was found to have the lowest *in vitro* eGI among the samples. When the sensory analysis results were evaluated according to the general acceptability criterion, the whole wheat bread with PP was the sample with the highest point.

Further clinical studies are required to explore the potential benefits of these products and their impact on chronic diseases and potential side effects. Additionally, higher levels of PP may be needed to effectively reduce the glycemic index of bread. However, it is crucial to also assess the palatability and overall acceptability of PP added products to ensure their practical use.

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Evaluation of Consumers' Ability to Use and Understand Food Labels*

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Abstract

Aim: This study aimed to examine consumers' ability to use and understand food labeling.

Method: This cross-sectional study was conducted in April 2024 with 403 consumers aged 18-64 years living in Kırklareli, who volunteered to participate. Data were collected face-to-face using the Personal Information Form and Food Label Understanding and Use Skills Questionnaire (FLUUSQ).

Results: The mean age was 36.32 ± 12.25 years (range: 18-64) and 50.1% of the participants were male. The mean FLUUSQ score of the participants was 6.20±2.81 (Range: 0-10). Participants younger than 35 years of age (p=0.005), single (p=0.001), with an associate's degree or higher (p=0.000), and with previous nutrition education (p=0.000) had statistically significantly higher mean FLUUSQ scores. There was a statistically significant difference between the mean FLUUSQ scores and participants' shopping preferences, frequency of food label use, and time of reading food label information (p<0.05). The mean FLUUSQ scores were significantly higher among those who use food labels for nutritional (p=0.000) and health (p=0.012) needs, those who used the nutritional claim (p=0.001) and those who understood the information on the food label (p=0.002) were significantly higher. Consumers demonstrated an intermediate ability to use and understand food labels.

Conclusion: Consumers' ability to use and understand food labeling was significantly influenced by factors such as age, education, nutrition knowledge, and label usage habits. It is recommended to strengthen nutrition education and promote awareness about food labeling to enhance consumers' ability to make informed dietary choices.

Keywords: Food label, nutrition information, consumer research.

Tüketicilerin Besin Etiketlerini Kullanma ve Anlama Becerilerinin Değerlendirilmesi

Öz

Amaç: Bu çalışma, tüketicilerin besin etiketlerini kullanma ve anlama becerilerini incelemeyi amaçlamıştır.

Yöntem: Kesitsel bir çalışmadır: Bu kesitsel çalışma Nisan 2024'te Kırklareli'nde yaşayan ve çalışmaya katılmaya gönüllü olan 18-64 yaş arası 403 tüketici ile yürütülmüştür. Veriler Kişisel Bilgi Formu ve Besin Etiketi Anlama ve Kullanma Becerileri Anketi (FLUUSQ) kullanılarak yüz yüze toplanmıştır.

Bulgular: Yaş ortalaması 36,32 ± 12,25 yıl (Aralık: 18-64) olan katılımcıların %50,1'i erkektir Katılımcıların ortalama FLUUSQ puanı 6.20±2,81'dir (Aralık: 0-10). Yaşı 35'ten küçük (p=0,005), bekâr (p=0,001), ön lisans ve üzeri eğitim almış (p=0,000) ve daha önce beslenme eğitimi almış (p=0,000) katılımcıların ortalama FLUUSQ puanları istatistiksel olarak anlamlı derecede daha yüksektir. FLUUSQ puanları ile

katılımcıların alışveriş tercihleri, besin etiketi kullanma sıklıkları ve besin etiketi bilgilerini okuma süreleri arasında istatistiksel olarak anlamlı bir fark vardı (p<0,05). Besin etiketlerini beslenme (p=0,000) ve sağlık (p=0,012) ihtiyaçları için kullananların, beslenme iddiasını kullananların (p=0,001) ve besin etiketindeki bilgileri anlayanların (p=0,002) ortalama FLUUSQ puanları anlamlı derecede daha yüksektir. Tüketicilerin besin etiketini kullanma ve anlama becerisi orta düzeyin üzerinde bulunmuştur.

Sonuç: Tüketicilerin besin etiketlerini kullanma ve anlama becerileri yaş, eğitim, beslenme bilgisi ve etiket kullanım alışkanlıkları gibi faktörlerden önemli ölçüde etkilenmiştir. Tüketicilerin bilinçli beslenme tercihleri yapabilmelerini sağlamak için beslenme eğitiminin güçlendirilmesi ve besin etiketlemesi konusunda farkındalığın artırılması önerilmektedir.

Anahtar Sözcükler: Besin etiketi, beslenme bilgisi, tüketici araştırması.

Introduction

Non-communicable diseases (NCDs) are one of the leading causes of death in Türkiye, as they are globally. It is reported that 87% of deaths between the ages of 30-70 in Türkiye are due to NCDs[1]. Poor diet quality is a key risk factor for the development of NCDs, with the intake of certain nutrients linked to chronic conditions directly associated with the consumption of processed and packaged foods[2]. Accordingly, food labels play a key role in guiding individuals to improve diet quality and make healthy food choices. Consumers base their food choices on underlying factors such as motivations, sensory attributes, and abstract information provided by food labels[3]. Food labels constitute a significant public health instrument for promoting healthy dietary choices, and consumers' utilization of these labels facilitates healthier decision-making[4].

The availability of food labels does not imply their effective use or understanding, as healthier choices depend on how individuals engage with this information[5,6], which is shaped byvarious determinants, including socioeconomic and demographic factors, health-related behaviors, attitudes, and nutritional knowledge[7–9]. Promoting healthy food choices, rather than discouraging unhealthy ones, is regarded as a more effective strategy, highlighting the importance of reading and accurately interpreting food labels [10]. However, consumers often report not using or understanding food labels due to difficulties in reading, comparing products, and determining energy content, caring only about price, and not knowing how to use the label[8,11].

Considering the increasing consumption of packaged foods and the impact of food labels on healthy food choices, studies on consumers' interactions with food labels are gaining importance[12–14]. In Türkiye, studies have examined consumers' use of food labels, their habits, and attitudes, with findings indicating a tendency among participants to self-report an ability to understand the content of nutrition labels [15–19]. However, to our knowledge, no research has evaluated Turkish consumers' ability to understand and use food labels. Therefore, this study aims to assess consumers' awareness of food labels, their usage habits, comparison skills, and the impact of labels on healthy food choices.

Material and Methods

Study Design

This cross-sectional study was conducted in April 2024 with adults aged 18–64 living in Kırklareli, Türkiye. The population of Kırklareli in 2023 was reported as 377,156 with 246,256 individuals aged 18–64 by the Turkish Statistical Institute (TÜİK)[20]. The

minimum sampling size of the study was calculated as α=0.05 with 85% power (1-β err probe= 0.85) 392 for the correlation analysis according to the 0.15 effect size (d = 0.15) in the G*Power 3.1.9.4 program[21,22]. The study's inclusion criteria were adults aged 18 and 64 who have no reading and writing difficulties. In total, 403 participants were included in the study.

Ethical Statement

The study received approval from the Kırklareli University Institute of Health Sciences Ethics Committee (Protocol No: PR0506R1, 18.03.2024). A signed subject consent form in accordance with the Declaration of Helsinki was obtained from each participant.

Data Collection Instruments

Data were collected face-to-face using a questionnaire. The Questionnaire Form consisted of a Personal Information Form and a Food Label Understanding and Use Skills Questionnaire (FLUUSQ). The Personal Information Form consisted of questions about demographic and food label use (place of shopping, frequency of use, timing of reading food label information, nutritional claims used, information used, whether or not used for nutrition and health needs, and self-report of understanding). Body Mass Index (BMI) was calculated using self-reported height and weight measurements provided by participants, dividing weight by the square of height in meters, and classified according to World Health Organization (WHO) standards[23]. The FLUUSQ was created by researchers based on the literature[5,6,24–26]. The FLUUSQ consisted of 10 questions which are given in Table 1 aimed to reveal participants' competencies in understanding, using, and evaluating food labels by assessing their ability to use food labels. The questions required participants to calculate, compare, and interpret information from these food labels. Each question had one correct answer, scored as 1 for correct and 0 for incorrect, with a total scale of 0 to 10. The Cronbach's Alpha value of the FLUUSQ was calculated as 0.821.

Statistical Analysis

Descriptive statistics (n, %, mean±standard deviation (SD), min-max) were used. The normality of distribution was investigated by the Kolmogorov-Smirnov test. Mann-Whitney U test was used to compare the means of two independent groups while the Kruskal Wallis H test was used for the comparison of three or more group means. Tamhane's T2 test was used as a post hoc test. Data were analyzed in Statistical Package for the Social Sciences 23.0 (SPSS 23.0) (IBM Corp. Armonk, NY: USA. Released 2012) with $p<0.05$ considered statistically significant.

Results

The distribution of participants' correct responses to the FLUUSQ is presented in Table 1. The mean FLUUSQ score was 6.20±2.81 (median: 7.0; range: 0−10). Among the questions related to nutritional content and values, the most correctly answered was "How many grams of protein are in 100 grams of the product?" (75.7%), while the least correctly answered was "Which ingredient is the highest in the product?" (22.6%). Regarding label comparison, the most correctly answered question was "Which labeled product contains less fiber in one serving (30 g)?" (77.4%), while the least correctly answered was "According to the labels, which labeled product should a person with

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sesame allergy not consume?" (57.3%). Furthermore, 76.7% of participants correctly answered the question related to storage and consumption.

Table 1. Distribution of participants' correct answers to the FLUUSQ

Questionnaire	n	%
Nutrient content and values		
Which ingredient is the highest in the product?	91	22.6
How many grams of protein are in 100 grams of the product?	305	75.7
What is the energy value of 1 serving (30 g) of the product?	171	42.4
How many grams of fiber does 1 serving (30 g) of the product contain?	225	55.8
If you want to meet 34 grams of your daily carbohydrate needs from this product, how many grams should you consume?	253	62.8
Label comparison		
A person who has already met about 80% of their daily fat requirement would exceed their daily requirement if they consumed 100 g of which labeled product?	305	75.7
Which labeled product contains less fiber in one serving (30 g)?	312	77.4
Which labeled product would you prefer to reduce saturated fat consumption?	297	73.7
According to the labeling, which labeled product should a person with sesame allergy not consume?	231	57.3
Storage and consumption information		
How soon after opening should canned tuna be consumed?	309	76.7

Table 2 presents the descriptive characteristics and comparison of FLUUSQ total scores with participants' descriptive characteristics. The mean age was 36.32±12.25 years (median: 34, range: 18–65). Among them, 50.1% were male, 51.1% single and 64.7% had at least an associate degree. The results showed that 70.7% of the participants were employed and 46.7% of them reported that their income was equal to their expenses. Among the participants, 25.6% had at least one physician-diagnosed chronic disease, and

52.3% had a BMI within the normal range. Only 25.1% of the participants had prior nutrition education. Participants who were younger than 35 (p=0.005), single (p=0.001), had an associate's degree or higher (p<0.001), and had previous nutrition education (p<0.001) had significantly higher FLUUSQ scores.

Table 2. Comparison of the total scores of the FLUUSQ and the descriptive characteristics of the participants

	n(%)	X±SS	Test value	p
Gender				
Female	201(50.1)	6.40±2.71	-1.320[1]	0.187
Male	202(49.9)	6.00±2.90		
Age				
< 35	204(50.6)	6.65±2.55	-2.790[1]	0.005**
≥ 35	199(49.4)	5.74±3.00		
Marital Status				
Married	197(48.9)	5.62±3.11	-3.318[1]	0.001**
Single	206(51.1)	6.75±2.37		
Education status				
High school and below	142(35.2)	5.18±3.06	-5.023[1]	0.000***
Associate's degree and above	261(64.8)	6.76±2.50		
Income status				
Income < expense	114(28.3)	6.17±2.73	0.198[2]	0.906
Income = expense	188(46.6)	6.23±2.82		
Income > expense	101(25.1)	6.19±2.90		
Employment status				
Working	285(70.7)	6.32±2.71	-0.897[1]	0.370
Not working	118(29.3)	5.92±3.03		
Nutrition education status				
Yes	101(25.1)	7.21±2.41	-4.269[1]	0.000***
No	302(74.9)	5.86±2.86		
Chronic disease				
Yes	103(25.6)	6.10±2.86	-0.362[1]	0.718
No	300(74.4)	6.24±2.80		
BMI				
Underweight	16(4.1)	6.87±1.96	3.431[2]	0.330
Normal weight	211(52.3)	6.37±2.74		
Overweight	134(33.2)	5.95±2.85		
Obese	42(10.4)	5.88±3.25		

*p<0.05, **p<0.01, ***p<0.001, [1]Mann Whitney U test, [2]Kruskal Wallis H test

Table 3 shows nutrition claims and food label information checked by participants. The most read claims were 'trans-fat-free' (48.9%), 'rich in fiber' (39.1%), and 'vitamin and

mineral source' (33.3%), while expiration date (82.3%), ingredients (60.7%), and shelf life (54.2%) were the most checked label details.

Table 3. Nutrition claims and food label information checked by participants

	n	%
Nutrition claims read on food labels (n=302)*		
Trans-fat-free	186	48.4
Rich in fiber/ Source of fiber	150	39.1
Source of vitamins and minerals	128	33.3
Sugar-free	120	31.3
Protein source	109	28.4
Lactose-free	65	16.9
Gluten-free	56	14.6
Other	3	0.8
Information checked on food labels (n=302)*		
Expiration date	316	82.3
Ingredients	233	60.7
Shelf life	208	54.2
Additives	181	47.1
Sugars	145	37.8
Fats	138	35.9
Calories	132	34.4
Origin	119	31.0
Protein	108	28.1
Vitamin/mineral	87	22.7
Carbohydrate	79	20.6
Servings	70	18.2
Sodium/salt	63	16.4
Allergens	65	16.9
Cholesterol	58	15.1

* Indicates the number of participants who selected any option in a multiple-choice question.

Table 4 compares FLUUSQ scores with food label use. Most participants (86.8%) preferred grocery stores, 24.6% consistently checked labels, and 52.4% read them when purchasing. Additionally, 47.1% checked labels for nutrition, 46.2% for health, and 89.6% reported understanding label information. Supermarket shoppers had lower FLUUSQ scores than those using local groceries ($p=0.044$) or online shopping ($p=0.038$). Higher scores were observed among participants who sometimes ($p=0.002$) or always/most of the time ($p<0.001$) used food labels, checked for nutrition ($p<0.001$) and health reasons ($p=0.012$), used nutrition statements ($p=0.001$), and reported understanding label information ($p=0.002$). Participants who read nutrition labels both

during and after purchase had higher scores than those who did not (p=0.004), read only after purchase (p=0.013), or only while purchasing (p=0.017).

Table 4. Comparison of participants' FLUUSQ score and food label use characteristics

	n	X±SS	Test value	p
Shopping place preference				
Market[a]	350(86.8)	6.31±2.73		
Weekly street markets[b]	43(10.7)	5.00±3.27	7.762[1]	0.021[*]
Internet[c]	10 (2.5)	7.40±2.27		
Frequency of checking food labels in shopping				
Always or most of the time[d]	215(53.3)	6.86±2.42		
Sometimes[e]	108(26.8)	6.11±2.74	32.262[1]	0.000[***]
Rarely or never[f]	80(19.9)	4.55±3.19		
Timing of reading food label information				
I don't read[g]	19(4.7)	3.53±3.41		
While purchasing the product[h]	211(52.4)	6.26±2.76		
After purchasing the product[i]	31(7.7)	5.00±2.72	23.133[1]	0.000[***]
Both while purchasing and after purchasing[j]	142(35.2)	6.74±2.55		
Use of food labels for nutritional needs				
No	213(52.9)	5.57±2.98		
Yes	190(47.1)	6.91±2.42	-4.569[2]	0.000[***]
Use of nutrition labels for health needs				
No	217(53.8)	5.80±3.08		
Yes	186(46.2)	6.67±2.39	-2.506[2]	0.012[*]
Using any nutritional claim				
No	101(25.1)	5.35±3.11		
Yes	302(74.9)	6.49±2.64	-3.248[2]	0.001[**]
Understanding the information on the food labels				
No	42(10.4)	4.79±3.14		
Yes	361(89.6)	6.37±2.73	-3.121[2]	0.002[**]

*p<0.05, **p<0.01, ***p<0.001, [1]Kruskal Wallis H test, [2]Mann Whitney U test, Tamhane T2 was used to Post-Hoc Comparisons: b<a,c; f<d,e;g<h,j;i<j*

Discussion

This study examined consumers' ability to use and understand food labels and the factors affecting this ability. About one-quarter of participants had prior nutrition education, and their mean FLUUSQ scores were significantly higher than those without such education. Consistent with the literature, individuals with nutrition knowledge are more successful in reading, understanding, and interpreting food labels[12–14]. Additionally, food labeling and nutrition education interventions have been shown to improve label use and

comprehension[17,27], and consumers who have better nutrition knowledge use food labels more frequently than those with moderate or limited knowledge[28].

Influence of Demographic Characteristics

Younger individuals, those with higher levels of education, higher income, literacy, and numeracy skills are more likely to understand food labels[8,14,16,29]. Demographic factors such as age, education, and income also influenced FLUUSQ scores. In addition, education level was found to increase the likelihood of correct answers in food content and label comparison tasks[25]. Similarly, Sinclair et al. found that participants with higher levels of education were more successful in tasks requiring calorie calculation[30]. Consistent with prior research, participants younger than 35 years of age and those with at least an associate degree had significantly higher FLUUSQ scores, highlighting the influence of education and age on nutritional label comprehension[6,8,25,28–30]. Higher social class and income levels have a positive impact on consumers' knowledge, comprehension, and interpretation skills regarding food labels[25,28–31]. In contrast, mean FLUUSQ scores did not differ by income or employment status. This may be due to differences in how income status is classified in the literature compared to our study. Although no significant difference was observed between gender and mean FLUUSQ scores, previous studies have reported mixed results. Some suggest that women may better understand nutrition labels than men[14,29], while other show no significant gender differences in the judgment of the amount of a particular nutrient[25]. Additionally, some studies in the literature reported that gender did not affect calculation, and interpretation questions on labels[13,28,30]. Notably, Aryee et al. Found that men understood the food label better[32]. This difference may be attributed to variables such as education and gender roles that can influence men's and women's understanding of food labels[9,32]. Marital status also appeared to influence food choices and health outcomes, married men and women are less likely to purchase unhealthy foods[33]. Singles had significantly higher mean FLUUSQ scores, which may be influenced by age, given the regional average marriage ages of 26.1 for women and 29 for men[20].

Presence of Chronic Disease and Body Mass Index

Individuals who pay attention to health and healthy eating are more likely to use food labels[34].

Some studies report that consumers with chronic diseases, such as diabetes and cholesterol issues, are more aware of food labels and have a better understanding of reference intake[9,35], while Rothman et al. found higher food label comprehension among individuals without chronic diseases[29]. In contrast, the present study did not find a significant association between the presence of chronic disease and FLUUSQ scores. Similarly, no significant relationship was observed between BMI and FLUUSQ scores. Some studies align with our findings[28,30,36], while Kim et al. found that obesity influenced food label reading skills[13]. These inconsistencies may be due to factors that affect health motivation and health behaviors independent of BMI, such as weight satisfaction[37].

Food Label Use and Shopping Habits

Participants most frequently read nutritional claims on food labels were trans-fat-free (48.9%), rich in fiber/fiber sources (39.1%), and vitamin and mineral sources (33.3%).

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Similarly, Gezmen-Karadağ and Türközü reported that the most frequently read claim was trans-fat-free[16]. Claims of trans fats appear to be important for consumers[7]. Consistent with prior research conducted in Türkiye, the most important information for consumers is the expiration date[16,18].

Numeracy skills are reported to be the strongest inhibiting factor for label use, and people who dislike numbers and report that they are not good at using numbers are less likely to use food labels[34]. In our study, calculation-based questions had lower correct response rates, consistent with literature showing that consumers often struggle with interpreting reference intake values and portion sizes[8,27]. Previous studies also report difficulties in calculating nutrient content, emphasizing the importance of arithmetic and interpretive skills[29,31].

Participants who preferred supermarkets had significantly higher FLUUSQ scores than those shopping at weekly street markets or online. This may explain the difference, as lower exposure to food labels among weekly street market shoppers could reduce their motivation to engage with nutritional information and hinder label comprehension skills[38]. Participants who used food labels sometimes or always/most of the time had significantly higher FLUUSQ scores compared to those who rarely or never used them. Also, participants who read labels both while purchasing and after purchasing demonstrated the highest FLUUSQ scores. Similarly, Sinclair et al. found that participants who reviewed nutrition labels were more accurate in calorie estimation tasks[30]. Moreover, González-Vallejo et al found that participants who reported frequent use of the nutrition facts table made more accurate judgments using the label[39]. Health and nutrition are among the most frequently reported reasons for reading food labels[17]. In our study, participants who checked food labels for nutrition and health needs used nutritional claims and understood the information on food labels had significantly higher FLUUSQ scores. Similarly, Gomes et al. found that more than half of the participants who thought it was important to look for information on food labels answered the food choice question correctly[12].

A primary limitation of our study is that the FLUUSQ has not undergone any formal validation. Moreover, reliance on self-reported data introduces potential response bias. Additionally, data collection was restricted to Kırklareli, motivations underlying food label use were not explored, and selection bias may limit the generalizability of the findings. Despite these limitations, the FLUUSQ demonstrated good reliability, and the large sample size collected through face-to-face data collection enhances the study's robustness. Furthermore, this study is expected to contribute to the development of policies and educational programs aimed at promoting healthier food choices by highlighting the critical role of consumer understanding and use of food labels in fostering healthy eating habits.

Conclusion

Consumers' ability to use and understand food labels was above the intermediate level and influenced by demographic factors such as age, education, marital status, and prior nutrition education. Higher FLUUSQ scores were observed in participants under 35, single, with an associate's degree or higher, and those with nutrition education. Frequent label users, supermarket or online shoppers, and those checking labels for health reasons

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also scored higher. Given the link between healthy food choices and chronic diseases, food labeling is a key strategy. Promoting its effective use requires enhancing nutrition education and improving label accessibility, especially for vulnerable groups like the elderly and those with low education levels.

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Breastfeeding Attitudes of Women Who Get Pregnant During the Lactation Period*

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Abstract

Aim: This study aimed to evaluate the breastfeeding attitudes of women who became pregnant while still lactating.

Method: The study used a cross-sectional and descriptive research design. The sample consisted of 144 pregnant women who were in the lactation period and were admitted to the Gynecology and Obstetrics Polyclinic of a hospital in a city center for pregnancy examination between March 22, 2022, and July 1, 2022. The data were collected by face-to-face interview method, using the "Personal Information Form" and the "Breastfeeding Attitude Evaluation Scale (BAES)" data collection instruments.

Results: The majority of pregnant women (49.3%) were in the 18-25 age group, with a mean age of 26.34±5.59 years. It was found that 29.8% of the pregnant women were primary school graduates, 85.4% were unemployed, 57.7% were living in the district, and 64.6% living in a nuclear family. Pregnant women with 2–3 previous pregnancies, one living child, a prior vaginal delivery, a history of giving birth to both a girl and a boy, and an interpregnancy interval of 17 months or more had higher average BAES total scores. In addition, it was determined that there was a significant difference between mode of delivery, the baby's gender, whether the pregnancy was planned, the time between this and the previous pregnancy, and the BAES total score ($p < 0.05$). It was determined that the variables of place of residence, gender of the baby, and whether this pregnancy was planned were significant predictors of BAES. It was found that the attitudes toward breastfeeding of pregnant women who had planned pregnancy and who were living in the city center were significantly higher.

Conclusion: The study showed that the attitudes toward breastfeeding among women who experienced pregnancy during the lactation period were influenced by several factors, including the sex of the baby, place of residence, and planned pregnancy status. In order to improve the breastfeeding attitudes of women who become pregnant during the lactation period, reproductive health training should be organized especially for women living in rural areas and their pregnancies should be planned.

Keywords: Lactation, pregnancy, attitude.

Emzirme Döneminde Gebe Kalan Kadınların Emzirme Tutumları

Öz

Amaç: Bu çalışma, emzirme döneminde gebelik yaşamış kadınların tutumlarını değerlendirmeyi amaçlamaktadır.

Yöntem: Çalışmada kesitsel ve tanımlayıcı bir araştırma tasarımı kullanılmıştır. Araştırmanın örneklemini 22 Mart 2022 ile 1 Temmuz 2022 tarihleri arasında bir şehir merkezindeki hastanenin Kadın Hastalıkları ve

Doğum Polikliniğine gebelik muayenesi için başvuran 144 emzirme dönemindeki gebe kadın oluşturmuştur. Veriler yüz yüze görüşme yöntemi ile "Kişisel Bilgi Formu" ve "Emzirme Tutumunu Değerlendirme Ölçeği" veri toplama araçları kullanılarak toplanmıştır.

Bulgular: Gebelerin çoğunluğu (%49,3) 18-25 yaş grubunda olup, yaş ortalaması 26,34±5,59'dur. Gebelerin %29.8'inin ilkokul mezunu olduğu, %85,4'ünün çalışmadığı, %57,7'sinin ilçede yaşadığı ve %64,6'sının çekirdek ailede yaşadığı saptanmıştır. Gebelik sayısı 2-3 olan, yaşayan 1 çocuğu olan, daha önce normal doğum yapmış olan, daha önce kız bebek doğurmuş olan, daha önce erkek bebek doğurmuş olan ve gebeliği ile önceki doğumu arasında 17 ay ve daha fazla süre olan gebelerin Emzirme Tutumunu Değerlendirme Ölçeği toplam puan ortalamaları daha yüksektir. Ayrıca doğum şekli, bebeğin cinsiyeti, gebeliğin planlı olma durumu, bu gebelik ile bir önceki doğum arasında geçen süre ile Emzirme Tutumunu Değerlendirme Ölçeği toplam puanı arasında anlamlı bir fark olduğu tespit edilmiştir (p<0,05). Yaşanılan yer, bebeğin cinsiyeti ve bu gebeliğin planlı olup olmaması değişkenlerinin emzirme tutumu üzerinde anlamlı yordayıcılar olduğu belirlenmiştir. Gebeliği planlı olan ve şehir merkezinde yaşayan gebelerin emzirmeye yönelik tutumlarının anlamlı olarak daha yüksek olduğu bulunmuştur.

Sonuç: Çalışmada, emzirme döneminde gebelik yaşayan kadınların emzirmeye yönelik tutumlarının bebeğin cinsiyeti, ikamet yeri ve planlanan gebelik durumundan etkilendiği belirlenmiştir. Emzirme döneminde gebelik yaşayan kadınlarda emzirme tutumunun arttırılması için özellikle kırsal bölgelerde ikamet eden kadınlara üreme sağlığı eğitimleri düzenlenerek gebeliklerinin planlı olması sağlanmalıdır.

Anahtar Sözcükler: Laktasyon, gebelik, tutum.

Introduction

Breastfeeding is of great importance for the health of both the mother and the newborn. Breast milk is a unique food that can provide all the nutritional requirements for the growth and development of the infant after birth[1]. Breast milk is produced specifically for each mother's infant, and its nutrient content varies according to the characteristics and needs of the infant. This characteristic makes breast milk a miraculous food[1,2]. Breast milk is the most important health investment made in infancy, with long-term benefits into adulthood[1-3]. The World Health Organization (WHO) and The United Nations International Children's Emergency Fund (UNICEF) recommend that breastfeeding be initiated within the first hour of life, continued until two years of age with exclusive breastfeeding for the first six months, and continued with safe and appropriate complementary foods[1,3].

The United Nations International Children's Emergency Fund (UNICEF) reports that in 2020, 44% of newborns aged 0-5 months were exclusively breastfed, while 69% of infants aged 12-15 months and 44% of infants aged 12-23 months continued to receive breast milk[3]. In Turkey, data from the Turkish Demographic and Health Survey (TDHS) 2018 show that 41% of newborns aged 0-6 months are exclusively breastfed, while 33.5% of children aged 20-23 months continue to receive breast milk. The average duration of breastfeeding in Turkey is 16.7 months[3-5].

There are mothers who breastfeed throughout their second pregnancy. This practice is known as gestational breastfeeding. In this case, mothers must decide whether to wean their breastfed child or continue breastfeeding. Breastfeeding and pregnancy are among the most deeply rooted cultural taboos in societies[6]. Many breastfeeding women choose to stop breastfeeding when they become pregnant. There are important factors that discourage mothers from trying to continue breastfeeding during pregnancy. Mothers and health professionals are concerned about the impact of breastfeeding on preterm

birth, miscarriage, or low birth weight. In addition, mothers are often uncertain about whether breastfeeding will affect their energy reserves or the nutrition of the fetus. It has been reported that the bodies of pregnant women who are properly nourished are able to support both the breastfed child and the fetus. It has also been noted that inadequate nutrition can negatively affect the nutrients that the fetus needs for development and growth[7].

A literature review suggests that breastfeeding during pregnancy and tandem breastfeeding in the postpartum period are quite common[8-10]. Some physicians argue that breastfeeding during pregnancy may trigger preterm labour due to oxytocin release stimulated by nipple activity. Studies have shown that less oxytocin is released during breastfeeding and that the uterus becomes "desensitized" to oxytocin during pregnancy. Despite the administration of synthetic oxytocin, it has been observed that contractions do not start in breastfeeding women if labour is not due[9,11]. In our culture, breastfeeding during pregnancy is considered as 'stealing the right of the baby to be born' and it is believed that it is not right by our religion, so mothers who are found to be pregnant during lactation are directed to stop breastfeeding immediately[12]. However, according to the results of the study, there was no significant correlation between the occurrence of risky conditions during pregnancy, the risk of difficult delivery, neonatal APGAR (Activity, pulse, grimace, appearance, respiration) score and birth weight between women who continued breastfeeding during pregnancy and women who did not continue breastfeeding during pregnancy[10,11]. Pregnant women who are breastfeeding may discontinue breastfeeding for a variety of reasons, including concerns about religious appropriateness, fears that their breastfed baby may become ill, and concerns about potentially violating the rights of the unborn child. However, the literature suggests that tandem breastfeeding provides a protective effect against disease in infants under two years of age, has a positive effect on the psychological well-being of both infants and reduces potential sibling rivalry[10-12].

Material and Methods

Research Type

This study employed a descriptive cross-sectional research design.

Study Population and Sample

The study population consisted of pregnant women who presented to the gynecology and obstetrics outpatient clinic of a hospital affiliated with the Ministry of Health between March 22, 2022 and July 1, 2022. The G*Power 3.1 program was used to determine the sample size. The sample size was calculated according to the recommendations of Cohen (1988)[13] regarding the average effect size; and, in line with the two-sided hypothesis method, it was determined that 131 pregnant women should be included in the study with an effect size of H1 = 0.24, a confidence level of 80%, and a margin of error of 5%. After accounting for potential data loss (10%), the study was completed with a total of 144 pregnant women. As a result of the post hoc analysis at the end of the study, the power was 0.83 (1-β=0.83) with 144 pregnant women.

The study included mothers who were over 18 years of age, between 13 and 42 weeks of pregnancy, had a healthy pregnancy, conceived during the lactation period, breastfed

their infant for at least 30 days during pregnancy, and were required to be literate and free of mental or communication disorders.

Data Collection Tools: The data were collected using the Personal Information Form and the Breastfeeding Attitudes Evaluation Scale.

Personal Information Form: The form was developed by the researchers through a review of the literature and included a total of 20 questions, including mothers' sociodemographic (age, education, employment status) and obstetric (number of pregnancies, number of children, mode of delivery, duration of breastfeeding) characteristics.

Breastfeeding Attitude Evaluation Scale (BAES): The scale was developed by Arslan in 1997 to provide a measurement tool for assessing breastfeeding attitudes of postpartum mothers, by examining different dimensions of breastfeeding. The scale evaluates characteristics that may influence breastfeeding attitudes, such as attitudes toward breastfeeding related to the mother herself, other individuals, and society, and breastfeeding as a woman's specific function. The scale consists of 46 items on a 5-point Likert scale, with 22 positive and 24 reverse-coded items. The score for the positive items is 88, while the score for the negative items is 96. Since the positive attitude items are scored as strongly agree (4), agree (3), neither agree nor disagree (2), somewhat agree (1), and strongly disagree (0), and the negative attitude items are scored between strongly agree (0), and strongly disagree (4), the highest score that can be obtained on this scale is 184. Higher scores on the scale indicate mothers' positive attitudes toward breastfeeding[14]. In this study, Cronbach's alpha internal validity coefficient of the scale was calculated to be 0.86.

Statistical Analysis

The data obtained in the study were analyzed using the Statistical Package for Social Sciences (SPSS) 22.0 software package. Descriptive statistical analyses were used to evaluate the data. The independent samples t-test was used to assess the difference between the two means, given the normal distribution of the data. In addition, a one-way analysis of variance was used for three or more variables (Tukey's test was used to determine which group mean differed from the others in case of homogeneity, and Tamhane's T2 test was used when homogeneity was not present). Multiple linear regression analysis was used to evaluate the variables believed to influence the Breastfeeding Attitude Evaluation Scale, with a significance level of $p<0.05$.

In assessing the normality of the data, Kolmogorov-Smirnov test statistics and p-values, as well as skewness and kurtosis coefficients, were examined to determine the distribution from which the data of the variables were drawn. According to the recommendations of Tabachnick and Fidell (2013)[15], the distribution of the data was accepted to be within normal limits when the p-value was greater than 0.05 or the skewness and kurtosis coefficients were within ±2 limits.

Ethical Aspect of the Study

Ethical approval was obtained via e-mail from Arslan (1999)[15], who conducted the validity and reliability of the Breastfeeding Attitude Assessment Scale in Turkish. Ethics committee approval was obtained from the Clinical Research Ethics Committee of a state

university (Date: 16.12.2021, No: 01-01.11) and institutional permission from the state hospital where the research data were collected (Date: 22.03.2022, No: E-96172664-050.06.04). Written informed consent and verbal assent were obtained from the pregnant women who participated in the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Results

Table 1. Distribution of socio-demographic characteristics of the pregnant women and comparison with the total score of the Breastfeeding Attitudes Evaluation Scale (BAES)

Characteristic		n	%	BAES total $\bar{X} \pm SD$	Test value/p
Mean BAES total score $\bar{X} \pm SD$ (min-max)				89.95±8.52 (min-max: 73-117)	
Mean age $\bar{X} \pm SD$ (min-max)				26.34±5.59 (min-max: 18-40)	
Age	26 years and under	96	66.7	90.56±8.06	t=1.914
	27 years or older	48	33.3	87.90±5.33	p=0.056
Education status	Literate	28	19.4	85.89±7.26	F=2.359
	Primary school	43	29.8	90.43±8.68	
	Secondary school	40	27.8	91.98±7.29	p=0.056
	High School	27	18.8	89.96±9.77	
	University	6	4.2	92.00±10.67	
Occupation	Housewife	123	85.4	89.78±8.95	F=0.289
	Officer	13	9.0	90.23±5.19	p=0.749
	Worker/private sector	8	5.6	92.13±5.74	
Mean age of spouse $\bar{X} \pm SD$ (min-max)				31.17±6.47 (min-max: 20-53)	
Age of spouse	31 years and under	103	71.5	89.75±7.21	t=1.156
	32 years or older	41	28.5	87.46±4.90	p=0.203
Place of residence	Province	47	33.3	93.32±10.12[a]	*F=5.930*
	District	83	57.7	88.17±7.01[a]	*p=0.003*
	Village	13	9.0	89.15±7.91	
Family type	Nuclear Family	93	64.6	90.84±9.24	t=1.681
	Extended Family	51	35.4	88.35±6.81	p=0.095
Total		144	100.0		

BAES: Breastfeeding Attitude Evaluation Scale, F: One-way Analysis of Variance, t: Independent samples t-test, a: there is a significant difference between variables with the same letter.

The mean total score of the BAES was 89.95±8.52. This score indicated that the attitudes of women, who breastfed during pregnancy, toward breastfeeding were positive (Table 1).

The mean age of the pregnant women who participated in the research was 26.34±5.59 years, and 66.7% of them were in the 26 years and under group. A total of 29.8% of the pregnant women were primary school graduates, 85.4% were housewives, the mean age of their husbands was 31.17±6.47, 71.5% of their husbands were 31 years and under,

57.7% were living in the district, and 64.6% were living in a nuclear family (Table 1). In evaluating the mean scores obtained from the scale, it was found that pregnant women between the ages of 18 and 25 years, university graduates, employees/workers in the private sector, whose husbands were between the ages of 20 and 30 years, who lived in the provincial center, and who had a nuclear family type had a higher mean total score on the BAES. In addition, there was a significant difference between the place of residence and the total score on the BAES ($p<0.05$), while there was no statistical difference between the other variables and the total score on the scale ($p>0.05$) (Table 1).

Table 2. Distribution of obstetric characteristics of the pregnant women and comparison with total score of the Breastfeeding Attitudes Evaluation Scale (BAES)

Characteristic		n	%	BAES total $\bar{X} \pm SD$	Test value/ p
Mean number of pregnancies $\bar{X} \pm SD$ (min-max) 8)				3.33±1.32 (min-max: 2-	
Number of pregnancies	2-3 pregnancies	85	59.0	91.27±8.83	F=2.945 p=0.056
	4-5 pregnancies	50	34.7	87.64±7.99	
	6 and over	9	6.3	90.44±5.83	
Mean number of living children $\bar{X} \pm SD$ (min-max)				2.71±1.24 (min-max: 1-7)	
Number of living children	1 child	25	17.4	90.54±10.19	F=0.419 p=0.659
	2-3 children	85	59.0	90.25±8.53	
	4 and over	34	23.6	88.79±7.26	
Previous mode of delivery	Normal delivery	72	50.0	91.92±10.43	*t=2.792 p=0.006*
	C-section	72	50.0	88.01±5.49	
Gender of baby in this pregnancy	Female	75	52.1	92.36±9.27	*t=3.658 p=0.000*
	Male	69	47.9	87.36±6.79	
Gender of previous baby	Female	76	52.8	89.39±7.38	t=-0.817 p=0.416
	Male	68	47.2	90.58±9.67	
Planned status of this pregnancy	Yes	4	2.8	102.75±11.58	*t=3.141 p=0.002*
	No	140	97.2	89.58±8.17	
Time between this pregnancy and previous delivery	2-6 months	35	24.3	87.54±6.89[ab]	*F=3.205 p=0.025*
	7-11 months	79	54.8	89.65±7.54	
	12-16 months	25	17.4	92.84±10.91[a]	
	17 months and over	5	3.5	97.00±14.04[b]	
Time between this pregnancy and previous delivery (months) $\bar{X} \pm SD$ (min-max)				9.22±3.80 (min-max: 2-24)	
Total		144	100.0		

BAES: Breastfeeding Attitude Evaluation Scale, F: One-way Analysis of Variance, t: Independent samples t-test, a-b: there is a significant difference between variables with the same letter.

The mean number of pregnancies was 3.33±1.32, the mean number of living children

was 2.71±1.24, and the mean time between this pregnancy and the previous childbirth was 9.22±3.80 months. 59% of the pregnant women had 2-3 pregnancies, 59% had 2-3 living children, 50% had a normal delivery, and 52.1% had a female baby in the current pregnancy, 52.8% of the women had a female infant in their previous pregnancy, 97.2% of the women had an unplanned pregnancy, and 54.8% of the women had an interval of 7-11 months between this pregnancy and the previous birth (Table 2). In the evaluation of the mean scores on the scale, pregnant women who had 2-3 pregnancies, had 1 living child, had a normal previous delivery, had a baby girl, had a baby boy previously, and had an interval of 17 months or more between their pregnancy and their previous birth, had higher average BAES total scores. In addition, it was determined that there was a significant difference between the mode of delivery, gender of the baby, the planned status of the pregnancy, the time between this pregnancy and the previous birth, and the BAES total score ($p<0.05$), while there was no statistically significant difference between other variables and the total scale score ($p>0.05$). The results showed that the attitude toward breastfeeding was significantly higher among pregnant women with a planned pregnancy (Table 2).

Table 3. Distribution of pregnant women according to their characteristics related to breastfeeding and comparison with the total score of the Breastfeeding Attitude Evaluation Scale (BAES)

Variable		n	%	BAES total X̄ ± SD	Test value/p
How long she breastfed her previous baby during pregnancy	One month	29	20.1	87.07±7.10[a]	**F=5.113 p=0.002**
	Two months	42	29.2	87.68±7.33[b]	
	Three months	42	28.5	91.12±9.77	
	Four months and over	32	22.2	93.97±7.83[ab]	
Opinion on breastfeeding success during pregnancy	Good	21	14.6	94.43±10.25[a]	**F=4.667 p=0.011**
	Medium	95	66.0	89.79±7.80	
	Poor	28	19.4	87.14±8.39[a]	
Opinion on whether breastfeeding during pregnancy is harmful to the unborn baby	Yes	107	74.3	88.87±8.64[a]	**F=3.684 p=0.028**
	No	2	1.4	89.00±5.65	
	Don't know	35	24.3	93.29±7.49[a]	
Opinion on breastfeeding when learning about present pregnancy while breastfeeding	I should continue breastfeeding	6	4.2	92.67±7.09[a]	**F=6.059 p=0.001**
	I should stop breastfeeding	73	50.6	87.48±6.92	
	It is more convenient to feed my previous baby with formula	7	4.9	86.00±6.38	
	Both my unborn baby and the baby in my arms need me.	58	40.3	93.19±9.56[a]	
The presence of a person who is opposed to her breastfeeding her baby during pregnancy	Yes	140	97.2	89.91±8.63	t=-0.368 p=0.714
	No	4	2.8	91.50±2.38	
Opinion on abortion when learning about present pregnancy while breastfeeding	Yes	10	6.9	91.80±9.56	t=0.710 p=0.479
	No	134	93.1	89.81±8.46	
Opinion on using a family planning method when this pregnancy ends	Yes	134	93.1	89.84±8.70	t=-0.556 p=0.579
	No	10	6.9	91.40±5.54	
Total		**144**	**100.0**		

BAES: Breastfeeding Attitude Evaluation Scale, F: One-way Analysis of Variance, t: Independent samples t-test, a-b: there is significant difference between variables with the same letter

A total of 29.2% of the pregnant women breastfed their babies for two months during

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pregnancy, 66.0% of these women rated the success of breastfeeding during pregnancy as moderate, 74.3% believed that breastfeeding during pregnancy was harmful to the baby, 50.6% of the women indicated that they would stop breastfeeding if they found out they were pregnant while breastfeeding, 97.2% of the women experienced resistance to breastfeeding their babies during pregnancy, 93.1% of the women would not consider terminating their pregnancy when they learned they were pregnant while breastfeeding, and 93.1% would consider using a family planning method after this pregnancy (Table 3). The mean scores from the scale showed that women who breastfed for four months or more during pregnancy, those who felt their breastfeeding experience was successful, those who didn't know whether breastfeeding could harm the unborn baby, those who planned to continue breastfeeding during pregnancy, those who didn't plan to use birth control after discovering they were pregnant, who had no family members that oppose breastfeeding during pregnancy, those who considered terminating their pregnancy while breastfeeding, and those who didn't consider family planning methods after this pregnancy had higher mean total scores on the BAES. When the total score of the BAES was compared with various variables, a significant difference was observed in factors such as duration of breastfeeding the previous baby, perception of breastfeeding success while breastfeeding the current baby during pregnancy, concerns about potential harm to the unborn baby from breastfeeding during pregnancy, and perceptions about breastfeeding upon discovery of pregnancy during breastfeeding (Table 3).

Table 4. Breastfeeding Attitude Evaluation Scale total score regression analysis

Independent variables of the Breastfeeding Attitude Evaluation Scale	β	S.E.	p*	95% CL	
				Lower	Upper
Place of residence	**-2.303**	**1.109**	**0.040**	**-4.496**	**-0.110**
Previous mode of delivery	0.026	1.610	0.987	-3.158	3.211
Gender of baby in this pregnancy	**-3.055**	**1.339**	**0.024**	**-5.703**	**-0.406**
Gender of previous baby	-0.400	1.361	0.769	-3.093	2.293
Planned status of this pregnancy	**-9.513**	**4.064**	**0.021**	**-17.553**	**-1.473**
Time between this pregnancy and previous delivery	1.931	1.006	0.057	-0.058	3.920
How long she breastfed her previous baby during pregnancy	0.718	0.943	0.448	-1.148	2.583
Opinion on breastfeeding success during pregnancy	-0.513	1.431	0.721	-3.343	2.318
Opinion on whether breastfeeding during pregnancy is harmful to the unborn baby	1.407	0.936	0.135	-0.444	3.258
Opinion on breastfeeding when learning about present pregnancy while breastfeeding	0.729	0.740	0.326	-0.735	2.192
R = 0.519 R² = 0.214 F = 4.866 **p = 0.000***					

*Multiple linear regression analysis

Analysis of the variables believed to affect pregnant women's BAES to predict BAES scores showed that these 10 predictor variables had a significant relationship with BAES (p<0.05). These variables explained 21.4% of the variance in breastfeeding attitudes. The order of importance of these variables on the dependent variable was evaluated according to the standardized regression coefficients, and the results showed that the time between this pregnancy and the previous birth had the highest importance (β=1.931), while the planned pregnancy had the lowest importance (β=-9.513). After conducting significance tests on the regression coefficients, it was found that the variables of place of residence, gender of the baby, and planned status of the current

pregnancy were significant predictors of BAES (p<0.05) (Table 4).

Discussion

Breastfeeding is one of the most important health indicators in improving maternal, infant, and community health. For this reason, it is stated that every newborn has the right to be breastfed until the age of 2 years. The duration of breastfeeding in the world and Turkey is not sufficient. In Turkey, about one-third of infants between 20-23 months of age continue to receive breast milk[4]. Although many factors reduce the duration of breastfeeding, the most important factor is frequent deliveries[16]. In this study, almost all participants had an unplanned pregnancy, and the interval between this pregnancy and the previous birth was 7-11 months in more than half of the participants. In the literature, similar to our study, it was found that attitudes toward breastfeeding were significantly higher among pregnant women who had a planned pregnancy and who had an interval of 17 months or more between their pregnancy and the previous birth[17].

Despite the widely accepted benefits of breastfeeding, the rate of exclusive breastfeeding for six months worldwide has not met the WHO recommendation[18]. In this study, 74.3% of pregnant women believed that breastfeeding during pregnancy was harmful to the baby, and half of them considered stopping breastfeeding when they discovered that they were pregnant while breastfeeding. In addition, our study found that the majority of pregnant women believed that there were people who would disapprove of them if they breastfed their infant during pregnancy, they did not consider terminating their pregnancies when they learned that they were pregnant while breastfeeding, and they planned to use family planning methods after their current pregnancy. Studies have shown that the majority of women breastfeed in the first trimester. This suggests that mothers faced challenges in stopping breastfeeding promptly due to unplanned pregnancies and lack of preparation, and they continued breastfeeding due to indecision and ignorance until they finally stopped breastfeeding altogether[19-20]. The results of this study are consistent with the literature.

In our study, we found that variables such as place of residence, planned pregnancy, and gender of the baby explained about a quarter of the variance in breastfeeding attitudes. It has been determined that the breastfeeding attitude scale score average of women living in villages is lower than those living in the city center, those who have unplanned pregnancies are lower than those who have planned pregnancies, and those who have male babies are lower than those who have female babies. In particular, it is vital that health professionals provide education and counseling on reproductive health and breastfeeding during pregnancy in order to ensure planned pregnancies. In addition, it is also important to include people who can influence women's decisions about breastfeeding and simultaneous breastfeeding during pregnancy in education and counseling sessions. Considering that the breast milk rate in our country is 98% immediately after birth[21], emphasizing the importance of family planning during postpartum and infant care, especially in primary health care settings, can significantly affect attitudes towards breastfeeding[21]. In the study conducted by Çınar et al. (2022) in which they evaluated the breastfeeding attitudes of mothers who were pregnant during the breastfeeding period, it was determined that the majority of mothers made an unconscious decision about feeding their children because they were not given accurate

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and sufficient information about starting breastfeeding in the first hour of the baby's life, giving breast milk, continuing breastfeeding during pregnancy, and simultaneous breastfeeding[22].

In this study, it was determined that women with higher education levels had higher average BAES scores and there was no significant difference between education level and breastfeeding attitude. It was determined that women living in the city center had higher average BAES scores than women living in villages and districts. In literature reviews, it was determined that education level, region of residence and working status affected women's breastfeeding levels[23,24].

In the study by Çınar et al. (2022)[22], it was stated that mothers who stopped breastfeeding during pregnancy felt psychologically good and were happy with this situation. Mothers usually go back and forth between breastfeeding and not breastfeeding because they are worried about the health of their babies and children, and their mood changes[23]. In this study, when asked what they thought about breastfeeding when they learned that they were pregnant during the breastfeeding process, it was determined that 50.6% of women considered stopping breastfeeding. Pregnancy during breastfeeding is common in Türkiye and is mostly unplanned. In cases where breastfeeding was terminated early, the mother became pregnant again during breastfeeding in 5.7% to 29.2%[25]. For mothers who are reluctant to breastfeed, a new pregnancy can be considered a valid reason to stop breastfeeding.

Breastfeeding attitude; It can be defined as the woman's view of breastfeeding, how she manages the breastfeeding process, the way she adheres to it and her behavior. A positive breastfeeding attitude ensures the early start and continuity of breastfeeding, supporting not only the physiological but also the cognitive, emotional and spiritual development of the baby, and ensuring and maintaining mother-baby interaction[26]. In this study, the total BAES score average of women who breastfed during pregnancy was found to be 89.95±8.52. This result shows that women's breastfeeding attitudes are low. In the study by Topaloğlu Ören et al.[27] evaluating postpartum breastfeeding attitudes, the total BAES score average was 100.38-18.88; in the study by Gölbaşı and Koç[28] evaluating women's breastfeeding behaviors in the first six months after birth and the effect of prenatal breastfeeding attitudes on postpartum breastfeeding, the total BAES score average of women was found to be 111.36±12.02. It is seen that these results are higher than the score average we obtained in our study. However, in the study by Yiğitbaş et al.[29] evaluating breastfeeding attitudes and behaviors of mothers who gave birth in hospitals in Trabzon, the total BAES score average was 76.34±18.81. It was determined from this study that our findings are higher. Studies have shown that breastfeeding attitude depends on the woman's level of knowledge about breastfeeding and breast milk, duration and frequency of starting breastfeeding after birth, her breastfeeding experiences, starting the first feeding with breast milk, skin-to-skin contact, social support, health experience, the role models she sees regarding breastfeeding the time. It is stated that it is affected by problems, health care policies and social perceptions.

Limitations: The data of this study is limited to mothers who breastfeed during pregnancy, and the results cannot be generalized to all pregnant women and mothers.

Drawbacks and Shortcomings: The disadvantage of this study is that it was not

conducted in larger sample groups and in a randomized manner. In other studies, it would be appropriate to evaluate breastfeeding attitudes among women who breastfeed and those who do not breastfeed during pregnancy.

Conclusion and Recommendations

Breast milk should be the first choice in nutrition for many reasons such as the nutrients it contains for the growth and development of the newborn, its easy accessibility, being clean and economical. It is undeniable that breastfeeding is a physiological event as well as a difficult and patient process. For this reason, the mother should be supported during pregnancy and breastfeeding afterwards. The health professional who will provide counselling should know that the effects of breastfeeding during pregnancy and breastfeeding both babies after birth on the mother, newborn and baby are the same as in other pregnancies and should advise mothers to continue breastfeeding. The choice should be based on the woman's preference. If breastfeeding during pregnancy is preferred, pregnancy and newborn follow-up should be increased. In order to ensure that health professionals do not lack information on breastfeeding during pregnancy, it is recommended that breastfeeding during pregnancy should be explained to students who are future health professional candidates within breastfeeding counselling. It is thought that it would be useful to include these two special processes within the scope of breastfeeding education.

Conflict of Interest

There is no conflict of interest.

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Authorship Contribution

EAA, DÇ; idea/concept, design, supervision, analysis, writing, critical review. EAA, DÇ; interpretation, writing, critical review. EAA, DÇ; sources, data collection, literature review.

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Determinants of Quality of Life in Patients After Thyroidectomy: Electrolyte Imbalance, Sleep Problems, and Fatigue

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Abstract

Aim: The study was conducted to determine the effects of electrolyte levels, sleep problems, and fatigue on quality of life in patients undergoing thyroidectomy.

Method: The study involved 93 participants who underwent thyroidectomy from April 2023 to August 2024. The study was conducted in a descriptive design. The data of the study were collected with the Descriptive Characteristics Questionnaire Form, Fatigue Severity Scale, Richard Campbell Sleep Scale, and SF-12 Quality of Life Scale. Independent sample t-test, one-way analysis of variance, dependent sample t-test, Pearson correlation and linear regression analysis were used to evaluate the data. Ethical approval, institutional permission, academic board permission, and informed consent were obtained. Electrolyte levels, quality of life, fatigue severity and sleep scale total scores of thyroidectomy patients were evaluated face to face before discharge and by phone first month post-discharge.

Results: Quality of life, fatigue and sleep quality scale scores were determined as 29.83±3.99, 38.41±20.61, and 35.77±14.17 respectively in the first month post-discharge. A significant, negative correlation was found between the quality of life and fatigue scale and the total score of the fatigue and sleep scale during the initial month following post-discharge. In the study, fatigue, sleep quality, calcium, phosphorus and magnesium levels explained 55% of the increase in quality of life after thyroidectomy.

Conclusion: At the conclusion of the study, it was ascertained that there was a decrease in sleep quality and quality of life, alongside an increase in fatigue levels in patients after thyroidectomy. The study helps healthcare professionals to provide better counseling to their patients and provides an up-to-date synthesis of quality of life, fatigue and sleep quality that may allow a more personalized approach.

Keywords: Telehealth, thyroidectomy, sleep, quality of life, fatigue.

Tiroidektomi Sonrası Hastalarda Yaşam Kalitesinin Belirleyicileri: Elektrolit Dengesizliği, Uyku Problemleri ve Yorgunluk

Öz

Amaç: Çalışma tiroidektomi uygulanan hastalarda elektrolit düzeyleri, uyku problemleri ve yorgunluğun yaşam kalitesi üzerine etkisinin belirlenmesi amacıyla yürütülmüştür.

Yöntem: Çalışma Nisan 2023-Ağustos 2024 tarihleri arasında 93 tiroidektomi hastası ile tamamlanmıştır. Çalışma tanımlayıcı desende yürütülmüştür. Araştırmanın verileri tanıtıcı özellikler anket formu, Yorgunluk Şiddeti Ölçeği, Richard Campbell Uyku Ölçeği ve SF-12 Yaşam Kalitesi Ölçeği ile toplanmıştır. Verilerin değerlendirilmesinde bağımsız örneklem t-testi, tek yönlü varyans analizi, bağımlı örneklem t-testi, Pearson

korelasyon ve doğrusal regresyon analizi kullanılmıştır. Etik onay, kurum izni, akademik kurul izni ve bilgilendirilmiş onam alınmıştır. Tiroidektomi hastalarının elektrolik düzeyleri, yaşam kalitesi, yorgunluk şiddeti ve uyku ölçeği toplam puanları taburculuk öncesi yüz yüze ve taburculuk sonrası 1 ayda telefon ile değerlendirilmiştir.

Bulgular: Taburculuk sonrası 1. ayda yaşam kalitesi, yorgunluk ve uyku kalitesi ölçek puanları sırası ile 29,83±3,99; 38,41±20,61 ve 35,77±14,17 olduğu belirlenmiştir. Taburculuk sonrası 1. ayda yaşam kalitesi ve yorgunluk ölçeği ile yorgunluk ve uyku ölçeği toplam puanı arasında anlamlı, negatif yönde bir ilişki bulunmuştur. Çalışmada yorgunluk, uyku kalitesi, kalsiyum, fosfor ve magnezyum düzeyleri tiroidektomi sonrası yaşam kalitesindeki artmanın %55'ini açıklamaktadır.

Sonuç: Çalışma sonunda tiroidektomi sonrası hastaların uyku kalitesinde ve yaşam kalitesinde azalma, yorgunluk düzeyinde artış olduğu belirlenmiştir. Çalışma sağlık çalışanlarının hastalarına daha iyi danışmanlık yapmasına yardımcı olurken, daha kişiselleştirilmiş bir yaklaşıma izin verebilecek güncel bir yaşam kalitesi, yorgunluk ve uyku kalitesi sentezi sunmaktadır.

Anahtar Sözcükler: Tele-sağlık, tiroidektomi, uyku, yaşam kalitesi, yorgunluk.

Introduction

Thyroid cancer is one of the most common malignancies of the endocrine system and accounts for 3.1% of global cancer incidences. According to data from the International Agency for Research on Cancer, 567 233 people were diagnosed with thyroid cancer worldwide in 2018, and 41 071 people lost their lives due to thyroid cancer. In our country, thyroid cancer, which is the fourth most common cancer, has an incidence rate of 5.9% (13.682) and a mortality rate of 0.63% (795). It is seen approximately three times more in women than in men[1].

There are two main treatments for thyroid cancer: surgical removal of all or part of the thyroid gland, which plays an important role in regulating physiological development and metabolism[2]. It has been reported that total thyroidectomy is more effective than other options in preventing hyperthyroidism[3]. In addition to the positive results of thyroidectomy surgery, patients face problems such as electrolyte imbalances and related symptoms, pain, nausea and vomiting, fatigue, sleep, and nutritional problems, which negatively affect their quality of life in the postoperative period[4].

One of the most common electrolyte imbalances after total thyroidectomy is hypocalcemia, which can be temporary or permanent. Hypocalcemia prolongs the length of hospital stay and can cause cramps, tingling, paresthesia, tetany, seizures, muscle spasms, and prolonged QT interval on the electrocardiogram[5]. Other problems experienced by patients include fatigue, mental changes, bone pain, headache, and insomnia[6]. Hypocalcemia can also cause changes in magnesium, phosphorus, and vitamin D levels[7-9]. To prevent complications that may develop due to hypocalcemia, patients are usually given calcium and vitamin D supplements during the perioperative period[10].

Chronic fatigue syndrome, defined as asthenia, is a common condition after thyroidectomy. It has been determined that patients experience decreased sleep quality and fatigue after thyroidectomy[11], and fatigue continues for more than a year in patients who have undergone total thyroidectomy[12]. Studies have found that patients' quality of life decreases after thyroidectomy[13-14]. Atasayar and Güler's studies have found that patients have difficulty performing daily activities after thyroidectomy, and this reduces

their quality of life[13]. Another study has also indicated that anxiety, depression, social dysfunction, burnout, and fatigue experienced after thyroidectomy negatively affect patients' quality of life[14].

In the management of all these symptoms that occur after thyroidectomy, measuring and monitoring electrolyte levels throughout the perioperative process is of great importance in terms of reducing possible complications. There are no studies in the literature examining serum electrolyte levels, sleep, fatigue, and quality of life of patients after thyroidectomy. Therefore, this study was conducted to determine the effects of electrolyte levels, sleep problems, and fatigue on the quality of life in patients who underwent thyroidectomy.

Material and Methods

The study was conducted at the Ear, Nose, and Throat (ENT) Department of Erciyes University Health Application and Research Center. The study was conducted as descriptive to determine the effects of electrolyte levels, sleep problems, and fatigue on quality of life after thyroidectomy. Patients who underwent thyroid surgery at the ENT clinic comprised the study's universe. Post-power analysis was performed for sample size and the G Power 3.1.9.4 program was used. The study was conducted with a total of 93 patients and the power of the study was found to be 99% in the post-power analysis.

Data Collection Tools

Data were collected with the Descriptive Characteristics Questionnaire Form, Fatigue Severity Scale (FSS), Richard Campbell Sleep Questionnaire (RCSQ), and SF-12 Quality of Life Scale (SF-12).

Descriptive Characteristics Questionnaire Form

The descriptive characteristics questionnaire form, which was created by the researchers by scanning the literature[15-20], consists of a total of 10 questions, including 5 questions about patients' sociodemographic data (age, gender, education level, occupation) and 5 questions about the clinical data after surgery (chronic disease, surgical history, smoking, American Society of Anesthesiologists (ASA) class, surgical duration).

Fatigue Severity Scale (FSS): The Fatigue Severity Scale, developed by Krupp (1989)[17] and validated for Turkish by Armutlu et al.[18] (2007), consists of 9 questions. Each question takes a value between 1 (I completely disagree) and 7 (I completely agree). The lowest possible score on the scale is 9, and the highest score is 63. The FSS value is the average value of the nine sections. Patients with an FSS score of less than 4 were evaluated as "not tired" and patients with a FSS score of more than 4 were evaluated as "tired". The Cronbach α value of the scale was determined to be 0.93 before discharge and 0.99 in the first month post-discharge.

Richard Campbell Sleep Questionnaire (RCSQ): The Richard Campbell Sleep Questionnaire developed by Richards[19] (1987), and validated for Turkish by Özlü and Özer[20] (2015), consists of 6 questions. Items are evaluated on a chart ranging from 0 to 100 using the visual analog scale technique. The score obtained from the scale is between "0-25" and indicates very bad sleep, while the score obtained from "76-100" indicates very good sleep. As the scale score increases, the sleep quality of the patients also

increases. The Cronbach α value of the scale was determined to be 0.87 before discharge and 0.96 in the first month post-discharge.

Short Form (SF)-12 Quality of Life Scale (SF-12): Ware[21] et al. (2001) developed the SF-12, which includes the same sub-dimensions by reducing the number of questions in SF-36. The Turkish validity and reliability of the scale were conducted by Soylu and Kütük[22] (2021). While the items related to the physical and emotional roles of SF-12 are answered dichotomously (yes or no), the other items have Likert-type options ranging between 3 and 6. The SF-12 total score ranges from 0 to 100, with higher scores representing better health. The Cronbach α value of the scale was determined to be 0.87 before discharge and 0.96 in the first month post-discharge.

Data Collection

The study was conducted in the ENT department of Erciyes University Health Application and Research Center. The study sample consisted of thyroidectomy patients hospitalized between April 2023 and August 2024. Patients who did not report hypocalcemia, tingling, or numbness and whose drainage volume fell below 10 ml within 14 hours were discharged in an average of 3-4 days. They were followed up in the outpatient clinic on the 15th day post-discharge. Patients aged 18 and over who had undergone thyroidectomy surgery and had no complications were included in the study. Questionnaires were filled out by the researchers voluntarily before and after surgery, from the patient files and by asking the patients. Before starting the study, patients were given preliminary information about the study (the purpose of the study, why the study was conducted, etc.). Data were collected by phone calls during the first month after the surgery. Electrolyte values (calcium, magnesium, and phosphorus) were evaluated by accessing them from the hospital system. Data collection took 15 minutes.

Ethical Considerations

In order to conduct the research, academic board permission (2021/01) from the Department of Surgical Diseases Nursing of the Faculty of Health Sciences of Erciyes University, ethical approval (date: 08.03.2023/ number: 2023/147) from the Ethics Committee of Clinical Research of Erciyes University, institutional permission from the Erciyes University Health Practice and Research Center, and written and verbal permission with an informed consent form from the patients who volunteered to participate in the research were obtained.

Data Evaluation

SPSS 25.0 (Statistical Package for Social Science) package program was used in the statistical analysis of the data. Descriptive statistics are given as unit number (n), and percentage (%). Independent sample t-tests were used to compare the differences in scale scores between demographic characteristics for paired groups, and one-way analysis of variance (ANOVA) was used for comparisons between two or more groups. Paired sample t-test was used to compare the scale means of the patients before discharge and in the first month post-discharge. Linear regression analysis was used to determine significant variables predicting independent variables. Pearson correlation analysis was used to determine the relationships between scale scores. Data were evaluated at a confidence interval of 95%, and significance was assessed at $p < 0.05$.

Results

The study was completed with a total of 93 thyroidectomy patients, and the mean age was 43.89. It was observed that 83.9% of the patients were female, 43.0% were primary or secondary school graduates, 82.8% were married, and 75.3% were unemployed. 60.2% of the patients had no chronic disease, 66.7% had previous surgical experience, and 91.7% were non-smokers. Also, 80.6% of participants were in the ASA II classification and 71.0% of them had surgery lasting between 2-4 hours (Table 1).

Table 1. Descriptive characteristics of thyroidectomy patients

	n (%)
Age	
18-37	29 (31.2)
38-51	34 (36.6)
52-73	30 (32.3)
Age Mean±SD	**43.89±14.13**
Gender	
Female	78 (83.9)
Male	15 (16.1)
Educational Status	
Illiterate	4 (4.3)
Primary School-Secondary School	40 (43.0)
High School	17 (18.3)
College and above	32 (3.4)
Marital Status	
Married	77 (82.8)
Single	16 (17.2)
Profession	
Worker	7 (7.5)
Civil Servant	10 (10.8)
Retired	6 (6.5)
Not Working	70 (75.3)
Chronic Disease	
Yes	37 (39.8)
No	56 (60.2)
Surgery History	
Yes	62 (66.7)
No	31 (33.3)
Smoking	
Yes	17 (18.3)
No	76 (81.7)
ASA Classification	
ASA I	14 (15.1)
ASA II	75 (80.6)
ASA III	4 (4.3)
Duration of Surgery	
0-2 hours	2 (2.2)
2-4 hours	60 (71.0)
4-6 hours	19 (20.4)
Over 6 hours	6 (6.5)
Total	93

Table 2 shows the total scores and correlation values of the scales. Before discharge, the total score of the SF-12 scale was 29.35±3.32, the total score of the FSS was 40.82±14.67 and the total score of the RCSQ scale was 23.77±13.38. No relationship was found between the scales before discharge. In the first month post-discharge, the total score of the SF-12- scale was 29.83±3.99, the total score of the FSS was 38.41±20.61, and the total score of the RCSQ scale was 35.77±14.17. In the first month post-discharge, a significant, negative, and moderate relationship was found between the total score of the SF-12 and FSS scales (r=-0.492, p<0.01). At the same time, a significant, negative, and weak correlation was found between the total score of the FSS and RCSQ scale (r=-0.227, p<0.05).

Table 2. The mean, standard deviation, and correlation values of the scales

	X±SD	1	2	3
Before discharge				
1.SF-12	29.35±3.32	1		
2. FSS	40.82±14.67	0.035	1	
3. RCSQ	23.77±13.38	-0.034	-0.166	1
First month post-discharge				
1.SF-12	29.83±3.99	1		
2. FSS	38.41±20.61	-0.492**	1	
3. RCSQ	35.77±14.17	0.109	-0.227*	1

Pearson rho (** p < 0.01, * p < 0.05); SF-12 = SF-12 Quality of Life; FSS=Fatigue Severity Scales; RCSQ= Richard Campbell Sleep Quality

Table 2 presents the descriptive characteristics of thyroidectomy patients before discharge and in the first month post-discharge and the comparison of scale scores. A statistically significant difference was found between smoking status and the total FSS scale score before discharge (p<0.005). No statistically significant difference was found between age, gender, education status, marital status, occupation, chronic disease, surgical history, ASA classification, surgery duration, and the total FSS scale score before discharge (p>0.05). At the same time, no statistically significant difference was found between age, gender, education status, marital status, occupation, chronic disease, surgical history, smoking, ASA classification, surgery duration, and the total SF-12 and RCSQ scale scores before discharge (p>0.05).

No statistically significant difference was found between age, gender, education status, marital status, occupation, chronic disease, surgical history, smoking habit, ASA classification, and duration of surgery and the 1st-month post-discharge SF-12 scale total score (p>0.05). A statistically significant difference was found between age and the 1st-month post-discharge FSS scale total score (p<0.005). It was observed that patients between the ages of 38-51 had higher 1st month post-discharge FSS scale total scores than patients between the ages of 52-73. However, no statistically significant difference was found between gender, education status, marital status, occupation, chronic disease, surgical history, smoking habit, ASA classification, and duration of surgery and the 1st-month post-discharge FSS scale total score (p>0.05). A statistically significant difference was found between age and the 1st-month post-discharge PCSQ scale total score

(p<0.005). It was observed that patients between the ages of 18-37 had higher PCSQ scale total scores in the first month post-discharge compared to patients between the ages of 38-51 and 52-73. A statistically significant difference was found between educational status and PCSQ scale total score in the first month post-discharge (p<0.005). It was determined that patients with a higher education level of college and above had higher PCSQ scale total scores in the first month post-discharge compared to patients with a primary-secondary school education level. A statistically significant difference was found between surgical history and PCSQ scale total score in the first month post-discharge (p<0.005). It was determined that PCSQ scale total scores in the first month post-discharge were higher compared to patients who had previously undergone surgery. In addition, no statistically significant difference was found between gender, marital status, occupation, chronic disease, smoking, ASA classification, surgery duration, and PCSQ scale total score in the first month post-discharge (p>0.05).

Table 3. Comparison of pre-discharge and first month post-discharge scale averages with descriptive characteristics

	Before discharge			First month post-discharge		
	SF-12	**FSS**	**RCSQ**	**SF-12**	**FSS**	**RCSQ**
Age						
18-37	29.931±3.315	39.896±15.237	24.896±12.207	29.896±3.667	35.517±21.44[ab]	42.448±10.785[a]
38-51	28.806±3.458	40.705±14.292	23.411±13.470	29.088±4.238	45.545±18.955[a]	28.548±14.011[b]
52-73	29.379±3.211	41.866±14.970	23.100±14.714	30.678±3.997	33.366±19.999[b]	36.827±14.142[b]
Test	F=0.853	F=0.132	F=0.150	F=1.226	**F=3.323**	**F=8.580**
p	t=0.429	t=0.876	t=0.861	p=0.298	**p=0.041**	**p=0.000**
Gender						
Female	29.306±3.242	41.435±14.451	24.859±13.608	29.289±3.669	39.717±20.971	36.333±14.382
Male	29.642±3.875	37.666±15.899	18.133±10.907	32.600±4.563	31.142±17.359	32.785±13.110
Test	t=0.018	t=0.288	t=1.253	t=0.771	t=2.024	t=0.552
p	p=0.893	0.593	p=0.266	p=0.382	p=0.158	p=0.459
Educational Status	26.750±3.403	31.500±20.469	34.250±11.870	30.333±6.506	25.250±17.519	43.250±11.586[ab]
Illiterate	29.054±3.045	43.125±13.812	23.000±14.084	29.461±3.647	39.700±21.047	30.513±14.465[b]
Primary School-Secondary School						
High School	30.294±3.349	39.411±13.928	23.647±14.269	30.058±4.775	44.750±17.326	35.352±13.720[ab]
College and above	29.548±3.557	39.875±15.424	23.500±12.197	30.125±3.908	35.281±21.432	41.322±12.297[a]
Test	F=1.424	F=0.963	F=0.862	F=0.197	F=1.362	**F=4.034**
p	p=0.241	p=0.414	p=0.464	p=0.898	p=0.260	**p=0.010**
Marital Status						
Married						
Single	29.554±3.396	42.129±14.272	23.233±13.297	29.946±4.033	39.026±20.518	35.081±14.050
	28.400±2.873	34.562±15.405	26.375±13.966	29.312±3.910	35.500±21.472	39.200±14.799
Test	t=0.342	t=0.013	t=0.014	t=0.084	t=0.268	t=0.046
p	p=0.560	p=0.911	p=0.904	p=0.773	p=0.606	p=0.831
Profession						
Worker	29.857±2.544	36.000±17.725	16.000±7.979	30.857±6.256	33.428±25.303	33.333±16.931
Civil Servant	28.22±3.929	41.600±12.971	21.000±13.256	29.900±3.695	44.300±18.744	37.222±14.131
Retired	28.000±3.346	50.833±8.035	15.833±11.267	31.000±7.293	39.800±20.462	33.333±12.225
Not Working	29.582±3.321	40.342±14.896	25.600±13.617	29.617±3.446	37.971±20.653	36.014±14.360
Test	F=0.831	F=1.227	F=2.122	F=0.382	F=0.418	F=0.152
p	t=0.480	t=0.305	t=0.103	t=0.766	t=0.740	t=0.928

Chronic Disease Yes No	29.400±2.912 29.333±3.597	43.189±15.104 39.267±14.297	24.918±13.643 23.017±13.289	30.055±3.405 29.690±4.366	38.432±21.750 38.400±20.011	34.911±15.046 36.309±13.728
Test **p**	t=2.036 p=0.157	t=0.001 p=0.977	t=0.019 p=0.891	t=3.451 p=0.067	t=0.835 p=0.363	t=0.940 p=0.335
Surgery History Yes No	29.034±3.265 29.967±3.410	40.016±14.910 42.451±14.277	23.838±12.777 23.645±14.759	30.450±4.027 28.645±3.719	36.532±19.943 42.300±21.752	35.966±13.143 35.379±16.356
Test **p**	t=0.021 p=0.885	t=0.959 p=0.330	t=0.462 p=0.498	t=0.055 p=0.816	t=0.038 p=0.846	**t=6.596** **p=0.012**
Smoking Yes No	28.125±2.753 29.630±3.397	45.000±11.258 39.894±15.235	23.235±13.259 23.894±13.503	29.411±5.220 29.932±3.698	45.352±20.472 36.840±20.449	27.625±13.622 37.516±13.748
Test **p**	t=0.941 p=0.335	**t=6.413** **p=0.013**	t=0.309 p=0.580	t=3.824 p=0.054	t=0.536 p=0.470	t=0.826 p=0.366
ASA Classification ASA I ASA II ASA III	29.642±2.307 29.366±3.431 28.500±4.991	42.500±13.580 40.400±14.937 43.000±16.512	23.500±11.901 13.595±13.595 17.750±16.520	30.214±4.593 29.917±3.893 27.000±3.559	40.928±21.652 37.473±20.318 47.000±25.651	33.153±13.024 36.630±14.435 26.333±10.969
Test **p**	F=0.269 t=0.765	F=0.164 t=0.849	F=0.431 t=0.651	F=1.086 p=0.342	F=0.523 p=0.595	F=1.021 p=0.365
Duration of Surgery 0-2 hours 2-4 hours 4-6 hours Over 6 hours	26.000±5.656 29.562±3.380 29.388±2.615 28.000±4.242	51.500±10.606 40.484±14.495 38.842±16.563 47.333±10.250	21.500±0.707 23.969±14.364 22.789±10.003 25.500±15.693	30.500±9.912 29.569±4.023 31.166±3.729 28.500±2.588	41.000±31.112 38.230±20.695 37.210±20.708 43.333±21.768	31.000±22.627 35.333±14.167 40.388±14.629 28.166±7.833
Test **p**	F=1.039 t=0.380	F=0.871 t=0.460	F=0.089 t=0.966	F=1.003 t=0.396	F=0.144 t=0.934	F=1.322 t=0.273

t: t-testi, F: Anova, SF-12= SF-12-TR Quality of Life; FSS=Fatigue Severity Scales; RCSQ= Richard Campbell Sleep Quality

The changes in scale scores and electrolyte levels of thyroid surgery patients before discharge and in the first month post-discharge are given in Table 4. A statistically significant difference was found between RCSQ, calcium, and magnesium levels before discharge and in the first month post-discharge ($p<0.005$). No statistically significant difference was found between SF-12, FSS, and phosphorus levels before discharge and in the first month post-discharge ($p>0.05$).

Table 4. Changes in quality of life, fatigue, sleep, and electrolytes in thyroid surgery patients before dischargeand during the first month post-discharge

	Before discharge	**First Month Post-discharge**	**Test**
SF-12	29.35±3.32	29.83±3.99	t=-0.767 p=0.445
FSS	40.82±14.67	38.41±20.61	t=1.034 p=0.304
RCSQ	23.77±13.38	35.77±14.17	**t=-5.633** **p=0.000**

Calcium	8.53± 0.65	9.46±0.42	**t=-6.266** **p=0.000**
Phosphorus	3.57±0.87	3.78±0.76	t=-0.369 p=0.717
Magnesium	0.79±0.07	0.85±0.06	**t=-2.594** **p=0.011**

SF-12= SF-12-TR Quality of Life; FSS=Fatigue Severity Scales; RCSQ= Richard Campbell Sleep Quality

According to linear regression analysis, a positive and significant relationship was found between the quality of life after thyroidectomy and fatigue, sleep quality, calcium, phosphorus, and magnesium levels ($p < 0.05$). It also explains 55% of the factors affecting the quality of life after thyroidectomy. Fatigue, sleep quality, calcium, phosphorus, and magnesium levels explain 55% of the change in the quality of life after thyroidectomy (R^2: 0.553; F: 4.710; $p < 0.05$) (Table 5).

Table 5. Evaluation of factors affecting quality of life scale scores of thyroidectomy patients using multiple linear regression analysis

Independent Variable	B[†]	SE[†]	β[†]	t	p values	95% CI[†]	
FSS	-0.159	0.049	-0.607	-3.252	**0.009**	-0.268- -0.050	R^2 = 0.553
RCSQ	0.047	0.093	0.101	0.499	0.629	-0.162- 0.255	
Kalsiyum	-2.579	2.359	-0.205	-1.093	0.300	-7.835- 2.677	
Fosfor	1.541	1.473	0.212	1.046	0.320	-1.741- 4.822	F = 4.710
Magnezyum	66.337	19.171	0.635	3.460	**0.006**	23.621- 109.052	**p=0.018**

[†]B:unstandardized regression coefficient; SE:standard error; β:standardized regression coefficient; CI:confidence interval, SF-12 = SF-12 Quality of Life; FSS=Fatigue Severity Scales; RCSQ= Richard Campbell Sleep Quality

Discussion

Thyroidectomy is frequently performed today as a surgery related to the thyroid gland, which is an important endocrine gland. Complications that may develop after thyroidectomy have been brought under control in recent years thanks to advances in technology. However, some permanent physical symptoms can significantly reduce the patient's quality of life[23]. Permanent physical symptoms include calcium, hemostasis problems, imbalance in thyroid hormones, and uncertainty about general health status, which are factors that reduce the quality of life for patients[24]. As a result, patients may experience a decrease in quality of life, sleep problems, fatigue, and a decrease in daily activity levels[25]. Therefore, this study was conducted descriptively to determine the effects of electrolyte levels, sleep problems, and fatigue on the quality of life in patients who underwent thyroidectomy.

In the study, it was determined that the average age of patients who underwent thyroidectomy was 43.89, and 83.9% were women. These results are consistent with the literature and it is stated that thyroid diseases are generally more common in women[26-28]. The reason why women are prone to thyroid diseases is associated with hormonal changes[26]. In patients who underwent thyroidectomy, the pre-discharge quality of life, fatigue, and sleep quality scale scores were determined to be 29.35±3.32, 40.82±14.67, and 23.77±13.38, respectively. When the total scale scores were examined, it was observed that the total quality of life scores were low, the total fatigue scores were high and the sleep quality scores were lowIn the first month after post-discharge, there was a significant, negative, and moderate correlation between the total SF-12 and FSS scale scores. There was also a significant, negative, and weak correlation between the total FSS and RCSQ scale scores. In the first month post-discharge, the quality of life, fatigue, and sleep quality scale scores were 29.83±3.99, 38.41±20.61, and 35.77±14.17, respectively. Total scale scores showed that the total quality of life scores were low and remained at similar levels, the total fatigue scores were high but decreased compared to pre-discharge, and the sleep quality scores were moderate and increased compared to pre-discharge. When the changes in the scale scores and electrolyte levels of the patients before discharge and in the first month post-discharge were examined, a statistically significant difference was found between the RCSQ, calcium, and magnesium levels. In the systematic review conducted by Landry et al., it was observed that the quality of life of the patients decreased in seven studies. At the same time, it was stated that the psychological and social quality of life of the patients decreased in five studies. The main reasons for the decrease in quality of life include physical fatigue, cognitive complaints, sleep problems, pain, vocal symptoms, concentration problems, scarring, weight problems, decreased motivation, somatization, anxiety, decreased social and physical functions, and changes in roles[24]. When all these factors are considered, the importance of providing holistic care to thyroidectomy patients, not only physically but also psychologically and socially, becomes evident. Apparently, the increasing number of thyroid cancer cases and their detection in younger patients will maintain their importance in the coming years due to their effects on quality of life.

A prospective observational study examined sleep quality after thyroidectomy. The quality of sleep of the patients was observed to decrease during a six-month follow-up period at the conclusion of the study. This situation was particularly associated with anxiety about recurrence, postoperative complications, and neck scars[25]. Similarly, another study evaluating sleep quality after thyroidectomy reported that patients suffered from sleep disorders. The main reasons for sleep problems were stated to be awareness of metastatic status, treatment process, and fear of cancer. Sleep disturbances present as challenges in initiating sleep, early awakening, and numerous nocturnal awakenings. A decrease in sleep quality can lead to fatigue, mood disorders, and concentration disorders[29]. Therefore, studies should focus not only on evaluating sleep quality but also on the results of therapeutic treatment methods for sleep problems.

Fatigue is both a condition caused by insomnia and a factor that reduces quality of life. A study of 216 thyroidectomy patients revealed that 61% of the patients reported fatigue most of the time for 1 year after surgery[12]. In another study, 38.2% of the participants

reported decreased energy and 50.7% reported moderate fatigue. Young age, history of depression, comorbidity, and suppression of thyroid hormone were associated with lower energy levels. Low calcium levels and low energy levels were also associated with fatigue[30]. Recurrent fatigue, mental changes, pain, and insomnia caused by problems caused by electrolyte imbalances after total thyroidectomy are also problems that reduce the quality of life experienced by patients and affect a significant portion of the patients[6]. In the study, fatigue, sleep quality, calcium, phosphorus, and magnesium levels explained 55% of the increase in quality of life after thyroidectomy. Therefore, it is important to examine the effects of electrolyte levels, fatigue, and sleep problems on quality of life.

Conclusion and Recommendations

The findings obtained from the study demonstrated that patients had decreased sleep quality, increased fatigue levels, and decreased quality of life after thyroidectomy. The relationship between quality of life and fatigue, fatigue and sleep quality was revealed. Fatigue, sleep quality, calcium, phosphorus, and magnesium levels are responsible for half of the change in quality of life after thyroidectomy. The study provides a current synthesis of quality of life, fatigue, and sleep quality that will allow a more personalized approach while helping healthcare professionals better counsel their patients. Therefore, long-term follow-up and holistic care are recommended for patients after thyroidectomy.

Limitations and Strengths of the Study

The limitations of the study include being conducted in a single center, having a small sample size, and having a long data collection process. In addition, the few studies examining the effects of thyroidectomy on electrolytes, fatigue, sleep quality, and quality of life, and the short follow-up period are among the limitations. Its strength is that it provides a synthesis of electrolytes, fatigue, and sleep quality.

Acknowledgment

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Authors' Contributions

G.M., Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing.

Y.S., Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing.

S. K. K., Conceptualization, Investigation, Methodology, Project Administration.

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The Prognostic Importance of Protein Energy Wasting in Chronic Kidney Disease: A Sectional Monocentric Study

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Abstract

Aim: The purpose of this study is to determine the frequency of Protein Energy Wasting (PEW) in individuals with chronic kidney disease (CKD) and evaluate the relationship between PEW and anthropometric measurements, biochemical parameters, and nutritional status of individuals.

Method: The study was conducted with 119 predialysis individuals aged 19 and over with CKD. The biochemical parameters and anthropometric measurements of the participants were evaluated, and their nutritional status was determined by Subjective Global Assessment (SGA) and PEW criteria. Nutritional status was classified as good, moderate nutritional deficiency, and severe malnutrition according to SGA. The presence of PEW was accepted if ≥3 categories for PEW were met.

Results: According to SGA, 20.2% of the individuals had moderate/severe malnutrition and 8.4% PEW. It was determined that with the increase in the number of PEW criteria in individuals, the body weight, body mass index (BMI), upper middle arm circumference, triceps skin fold thickness and body fat percentage; serum total protein, albumin, calcium and magnesium levels; intake amounts of many macro and micro nutrients have decreased significantly. It was detected that BMI (26.8%), albumin (18.6%), fiber (14.1%) and magnesium (15.7%) were the parameters most explaining the number of PEW criteria met by individuals.

Conclusion: PEW was related to anthropometric measurements, biochemical parameters and nutrient intakes. So, using the PEW tool at certain intervals from the moment of diagnosis will be a practical and effective intervention in reducing the prevalence of malnutrition.

Keywords: Anthropometric measurements, nutrition, chronic kidney disease, malnutrition, protein energy wasting.

Kronik Böbrek Hastalıklarında Protein Enerjisi İsrafının Prognostik Önemi: Kesitsel Tek Merkezli Bir Çalışma

Öz

Amaç: Bu çalışmanın amacı kronik böbrek hastalığı (KBH) olan bireylerde Protein Enerji Kaybı (PEK) sıklığını belirlemek ve PEK ile bireylerin antropometrik ölçümleri, biyokimyasal parametreleri ve beslenme durumları arasındaki ilişkiyi değerlendirmektir.

Yöntem: Çalışma 19 yaş ve üzeri KBH'li 119 diyaliz öncesi birey ile gerçekleştirildi. Katılımcıların biyokimyasal parametreleri ve antropometrik ölçümleri değerlendirilerek beslenme durumları Subjektif Global Değerlendirme (SGD) ve PEK kriteri ile belirlendi. Beslenme durumu SGA'ya göre iyi, orta derecede beslenme yetersizliği ve ciddi beslenme yetersizliği olarak sınıflandırıldı. PEK için ≥3 kategorinin karşılanması durumunda PEK'in varlığı kabul edildi.

Bulgular: SGD'ye göre bireylerin %20,2'sinde orta/ciddi malnütrisyon, %8,4'ünde PEK vardı. Bireylerde PEK kriterlerinin sayısının artmasıyla birlikte vücut ağırlığı, beden kütle indeksi (BKİ), üst orta kol çevresi,

triseps deri kıvrım kalınlığı ve vücut yağ yüzdesinin; serum toplam protein, albümin, kalsiyum ve magnezyum düzeyleri; birçok makro ve mikro besinin alım miktarları önemli ölçüde azalmıştır. Bireylerin karşıladığı PEK kriteri sayısını en çok açıklayan parametrelerin BKİ (%26,8), albümin (%18,6), posa (%14,1) ve magnezyum (%15,7) olduğu belirlendi.

Sonuç: PEK antropometrik ölçümler, biyokimyasal parametreler ve besin alımıyla ilişkiliydi. Dolayısıyla tanı anından itibaren PEK aracının belirli aralıklarla kullanılması malnütrisyon prevalansının azaltılmasında pratik ve etkili bir müdahale olacaktır.

Anahtar Sözcükler: Antropometrik ölçümler, beslenme, kronik böbrek hastalığı, malnütrisyon, protein enerji kaybı.

Introduction

Chronic kidney disease (CKD) is a costly worldwide health problem and its prevalence is increasing rapidly[1]. Malnutrition, which is seen at a high rate in individuals with CKD[2-4], is one of the important complications of CKD and causes negative results in terms of quality of life, morbidity and mortality[5]. Malnutrition has various causes such as decreased energy and protein intake, increased energy expenditure, anorexia, hormonal and metabolic changes[6].

Different definitions and diagnostic methods are used for malnutrition seen in individuals with CKD. In order to eliminate this confusion and to evaluate all aspects of nutritional and metabolic disorders such as cachexia, malnutrition and inflammation seen in CKD, the use of the concept of "Protein Energy Wasting (PEW)", which is associated with increased mortality in CKD population, has been recommended by the International Society of Renal Nutrition and Metabolism (ISRNM)[7]. PEW has been defined as the decrease in body protein stores and energy sources[8]. The existence of at least three of the parameters of biochemical markers, decreased body weight (BW), decreased muscle mass, decreased daily protein or energy intake in a patient is considered as presence of PEW, by ISRNM[9]. In various studies, PEW was evaluated in individuals with CKD and a relationship was found between the course of the disease and the presence of PEW[10-12]. However, studies with PEW evaluation in individuals with CKD who do not receive dialysis treatment are limited. Therefore, in this study, it was aimed to evaluate the relationship between the number of PEW criteria met by adult CKD patients not receiving dialysis treatment, and anthropometric measurements, biochemical parameters and nutritional status.

Material and Methods

General Plan of the Study

The sample size of the study was calculated using the G-Power program (version 3.0) using the values (2.2±0.8, 2.8±1.4, 3.5±1.8 and 3.3±1.4) in a similar study (Jagadeswaran et al., 2019) with a significance level of 0.05 and a power of 0.95. Accordingly, it was determined that a sample of at least 84 people would be sufficient for this study. This study was conducted in accordance with the principles of the Declaration of Helsinki on a total of 119 individuals, 72 men and 47 women, with CKD over the age of 19, who came to Ankara Bilkent City Hospital. The research comprised individuals who did not have a cardiac pacemaker, did not have an intellectual handicap, and hadn't undergone a surgical operation within the previous 30 days. Research data were

collected using a survey form and face-to-face interview technique and by obtaining informed consent from individuals. The research data started to be collected after obtaining the ethics committee approval, which numbered 231-14 and date 18/06/2019 from the Ankara University Ethics Committee and the institutional permission.

Anthropometric Measurements and Evaluation of Blood Pressure

BW (kg), body fat percentage (BFP,%) and lean body mass (LBM, kg) measurements of individuals made with Tanita BC 545 N brand analyzer. The BW (kg)/height (m^2) formula was used to calculate the Body Mass Index (BMI). A BMI below 23 kg/m² is considered an indicator for PEW by ISRNM[9]. Upper middle arm circumference (UMAC) and triceps skinfold thickness (TSFT) measurements of the patients were made in accordance with the technique[13]. The middle arm muscle circumference area (MAMCA), which was used to evaluate the status of having PEW, was calculated according to the [UMAC (cm)-(π×TSFT (cm)]²/4π-10 formula for men and [UMAC (cm)-(π×TSFT (cm)]²/4π-6,5 for women and was evaluated according to percentile values[14]. It was accepted that one of the PEW criteria was met if the MAMCA was more than 10% lower than the 50th percentile.

The blood pressure measurements of the participants were made three times after 20 minutes of rest with a digital sphygmomanometer, and the systolic and diastolic blood pressure values were recorded by taking the average of the last two to determine the result.

Evaluation of Protein Energy Wasting

For the diagnosis of PEW, the criteria suggested by the ISRNM under four different categories were used. These categories were serum biochemistry (serum albumin <3.8 g/dL, serum prealbumin <30 mg/dL, serum cholesterol <100 mg/dL), body mass (BMI <23 kg/m², unintentional weight loss: >5% in 3 months or >10% in 6 months, total body fat percentage <10%), muscle mass [muscle wasting: >5% in 3 months or >10% in 6 months, decrease in the mid-arm muscle circumference area (reduction >10% in relation to 50th percentile of reference population), appearance of creatinine] and daily nutrient intake (Protein intake <0.8 g/kg/day for the dialysis patient, <0.6 g/kg/day for the predialysis patient, daily energy intake <25 kcal/kg/day). For this study, serum albumin <3.8 g/dL criterion from category 1, BMI <23 kg/m² criterion from category 2, decrease in middle arm muscle circumference area (reduction >10% in relation to 50th percentile of reference population) criterion from category 3, protein intake below 0.6 g/kg/day criterion from category 4 have been evaluated. PEW was accepted if at least three of these four categories were present in a patient (provided that at least one criterion in each category was met)[9].

Determination and Evaluation of Food Consumption Status

Three-day food consumption records were taken from the patients to determine the food consumption status. All the foods consumed by the patients in the last 72 hours were questioned with the Food and Food Photography Catalog[15]. The daily average intake levels of energy and nutrients in the diet were determined, and these values were analyzed using the "Nutrition Information Systems Package Program" developed for Turkey.

Evaluation of Biochemical Findings

The biochemical parameters of the patients (blood glucose, total cholesterol/TC, low density lipoprotein cholesterol/LDL-C, high density lipoprotein cholesterol/HDL-C, triglyceride, total protein, albumin, urea, uric acid, creatinine, iron, total iron binding capacity/TIBC, ferritin, sodium, potassium, calcium, phosphorus, magnesium, C-reactive protein/CRP, glomerular filtration rate/GFR) were obtained by analyzing blood samples taken by nephrology nurses in the hospital laboratory.

Subjective Global Assessment

The Subjective Global Assessment (SGA) is a clinical assessment test that combines the subjective and objective aspects (BW change, dietary intake change, gastrointestinal symptoms and changes in functional capacity) of medical history with physical examination data (subcutaneous fat loss, muscle wastage, ankle or sacral edema). After evaluating the patients, their nutritional status was classified into three groups: well-nourished (SGA-A), moderately malnourished (SGA-B) and severely malnourished (SGA-C)[16].

Statistical Evaluation of Data

The data were analyzed with SPSS statistical package program. Descriptive statistics were shown as mean±standard deviation (SD) for variables with normal distribution and median and interquartile range (IQR) values for variables with non-normal distribution number of cases (n) and percentage (%) for nominal variables. The relationship between two categorical variables was determined by the Chi-Square test. Statistically significant difference situation between the categories of quantitative variables with ≥3 categories was evaluated with One Way ANOVA test if normal distribution assumptions were provided; if not Kruskal Wallis test was used. The relationship between two quantitative variables was determined using the Pearson Correlation Coefficient when both of the variables met the normal distribution assumptions and the Spearman Correlation Coefficient if at least one of the variables did not satisfy the normal distribution assumptions. In all statistical tests, the confidence interval was accepted as 95.0% and it was evaluated at $p < 0.05$ significance level.

Results

The study was conducted with 119 individuals with a median age of 64.0 (15.00) years and a mean GFR of 40.1±15.92 mL/min/1.73 m². It was determined that, as a result of the SGA 20.2% of the individuals had moderate or severe malnutrition and 8.4% with PEW.

According to Table 1, where the distribution of PEW presence was given according to the stage of CKD and SGA level, the incidence of PEW is higher in individuals in stages 4 and 5 of CKD compared to individuals in other stages ($p > 0.05$). At the same time, 19.2% of individuals without PEW and 30.0% of individuals with PEW had moderate and severe malnutrition according to SGA ($p > 0.05$).

Table 1. Distribution of PEW presence according to the stage of CKD and SGA level

PEW presence	Stage of CKD (n, %)				□² p
	Stage 2 (13, 10.9)	Stage 3 (74, 62.2)	Stage 4 (20, 16.8)	Stage 5 (12, 10.1)	
PEW [N, (%)]	1 (7.7)	6 (8.1)	2 (10.0)	1 (8.3)	6.275
Non-PEW [N, (%)]	12 (92.3)	68 (91.9)	18 (90.0)	11 (91.7)	0.958[a]
	SGA Level (n, %)				
PEW presence	SGA-A (95, 79.8)	SGA-B ve SGA-C (24, 20.2)			
PEW [N, (%)]	7 (70.0)	3 (30.0)			0.598
Non-PEW [N, (%)]	88 (80.8)	21 (19.2)			0.439[b]

[a] Fisher-exact Chi-square [b]Likelihood Chi-square test was used. *p<0.05

It was determined that the levels of BW, BMI, UMAC, TSFT and BFP decreased significantly according to the number of PEW criteria met by the individuals participating in the study (p<0.05) (Table 2).

Table 2. Anthropometric measurements and blood pressure levels according to the number of PEW criteria met by individuals

	Number of PEW criteria met				F/□²	p
	0 (n:15) [a]	1 (n:64) [b]	2 (n:30) [c]	≥3 (n:10) [d]		
Anthropometric measurements and blood pressures						
BW (kg) [a-d, b-d]	85.2 (12.20)	81.1 (19.80)	77.5 (15.17)	67.8 (8.22)	14.252	0.003*[α]
BMI (kg/m²)[a-c, a-d, b-d]	34.1 (5.05)	29.9 (6.25)	27.4 (5.67)	20.9 (4.24)	34.619	0.000*[α]
UMAC (cm)[a-c, a-d, b-c, b-d]	35.0 (4.00)	33.0 (5.88)	30.0 (4.00)	28.0 (3.50)	38.758	0.000*[α]
TSFT (mm)[a-d, b-d, c-d]	20.0 (10.00)	15.6 (11.00)	15.5 (9.25)	10.0 (4.27)	13.966	0.003*[α]
BFP (%)[a-b, a-c, a-d, b-c, b-d, c-d]	35.5±9.86	30.3±9.07	25.4±8.77	13.6±6.77	14.519	0.000*[β]
LBM (kg)	50.8 (18.90)	54.7 (17.67)	54.6 (19.88)	57.8 (10.70)	1.352	0.717[α]
SBP (mmHg)	158.6±13.57	140.5±17.36	155.5±37.17	133.9±40.44	0.107	0.745[β]
DBP (mmHg)	79.6±9.29	75.0±13.24	94.2±24.98	84.0±12.40	0.951	0.332[β]

Significant differences are indicated as exponent. [α] Kruskal Wallis test [β] One Way ANOVA test was used. *p<0.05

BW: Body weight, BMI: body mass index, UMAC: upper middle arm circumference, TSFT: triceps skinfold thickness, BFP: body fat percentage, LBM: lean body mass, SBP: sistolic blood presure, DBP: diastolic blood presure

When the biochemical parameters of the individuals were evaluated according to the number of PEW criteria they met, it was observed that the total protein, albumin, calcium and magnesium levels of the individuals decreased with the increase in the PEW criteria met (p<0.05) (Table 3).

Table 3. Biochemical parameters according to the number of PEW criteria met by individuals

Biochemical parameters	Number of PEW criteria met				F/$\square^2$	p
	0 (n:15) [a]	1 (n:64) [b]	2 (n:30) [c]	≥3 (n:10) [d]		
Blood glucose (mg/dL)	110.5 (55.75)	138.1 (47.00)	114.0 (41.50)	90.5 (13.25)	5.968	0.113[α]
TC (mg/dL)	196.5 (37.75)	188.5 (56.00)	177.0 (48.50)	201.5 (104.5)	3.540	0.316[α]
LDL-C (mg/dL)	119.5 (37.00)	109.0 (58.00)	101.0 (45.50)	133.5 (55.00)	2.186	0.535[α]
HDL-C (mg/dL)	44.5 (17.00)	44.5 (13.25)	37.0 (16.00)	37.0 (16.75)	2.454	0.484[α]
Triglyceride (mg/dL)	158.0 (91.75)	150.5 (102.5)	125.0 (160.0)	156.0 (88.00)	0.917	0.821[α]
Total Protein (g/dL) [a-b, a-d, b-d, c-d]	7.4 (0.50)	7.0 (0.60)	7.0 (0.60)	5.6 (1.70)	19.333	0.000*[α]
Albumin (g/dL) [a-d, b-d, c-d]	4.5 (0.50)	4.3 (0.40)	4.4 (0.60)	3.4 (0.80)	17.496	0.001*[α]
Urea (ng/dL)	67.5 (36.3)	62.0 (30.5)	62.0 (55.0)	87.0 (70.5)	2.245	0.523[α]
Uric acid (mg/dL)	7.8 (3.9)	7.4 (2.2)	7.4 (1.9)	7.5 (1.8)	2.316	0.509[α]
Creatinine (mg/dL)	1.5 (1.1)	1.5 (0.5)	1.8 (2.7)	1.8 (2.0)	2.662	0.447[α]
Iron (μg/dL)	53.0 (37.0)	50.0 (32.0)	68.0 (49.0)	39.0(-)	4.811	0.186[α]
TIBC (μg/dL)	327.0 (28.0)	338.0 (72.0)	299.0 (94.0)	325.0 (-)	1.729	0.631[α]
Ferritin (ng/mL)	42.0 (149.0)	53.0 (54.0)	88.0 (184.0)	51.0 (-)	2.682	0.443[α]
Sodium (mEq/L)	139.5 (7.8)	141.0 (5.0)	139.0 (2.0)	141.0 (3.0)	2.266	0.519[α]
Potassium (mEq/L)	4.6±0.70	4.6±0.53	4.4±0.67	4.6±0.60	1.482	0.223[β]
Calcium (mg/dL) [a-d, b-d, c-d]	9.4±0.49	9.2±0.50	9.3±0.80	8.9±0.71	3.228	0.025*[β]
Phosphorus (mg/dL)	4.0±0.63	3.7±0.74	4.1±0.98	4.0±0.87	0.324	0.808[β]
Magnesium (mg/dL) [a-b]	2.3 (0.4)	1.9 (0.3)	1.8 (0.5)	2.1 (0.5)	8.032	0.045*[α]
CRP (mg/dL)	7,7 (17,26)	5,6 (11,13)	5,6 (17,40)	8,8 (13,24)	1.207	0.751[α]
GFR (mg/dL)	37,3±15,47	41,3±13,96	36,5±17,49	39,0±20,18	0.128	0.943[β]

Significant differences are indicated as exponent. [α] Kruskal Wallis test [β] One Way ANOVA test was used. *$p < 0.05$

The intake levels of energy and nutrients according to the number of PEW criteria met by the individuals participating in the research were given in Table 4. It was determined that the intakes of carbohydrates, protein, total fat, MUFA, fiber and many micronutrients (excluding vitamins B12, C and E) decreased significantly with the increase in the number of PEW criteria met ($p < 0.05$).

Table 4. Intake levels of energy and nutrients according to the number of PEW criteria met by individuals

Energy and nutrients	Number of PEW criteria met				F/□²	p
	0 (n:15) [a]	1 (n:64) [b]	2 (n:30) [c]	≥3 (n:10) [d]		
Energy (kcal) [a-b, a-c, a-d, b-d]	1712.9±521.48	1338.2±537.63	1198.9±331.01	935.9±417.90	6.087	0.001*[β]
Carbohydrates (g) [a-d]	187.5 (108.51)	125.1 (56.92)	141.9 (51.95)	99.2 (98.89)	10.939	0.012*[α]
Protein (g) [a-c, a-d]	62.4 (17.88)	47.6 (39.56)	39.3 (9.70)	32.7 (28.18)	18.979	0.000*[α]
Total fat (g) [a-d]	65.2 (51.45)	52.2 (35.31)	47.5 (22.40)	28.5 (33.85)	10.832	0.013*[α]
PUFA (g)	10.1 (10.49)	8.1 (9.70)	5.7 (8.01)	5.5 (4.77)	7.123	0.068[α]
MUFA (g) [a-d]	25.4 (19.09)	19.4 (10.94)	16.9 (10.24)	10.2 (13.66)	10.413	0.015*[α]
SFA (g)	25.9 (12.40)	17.6 (11.84)	16.8 (6.49)	12.8 (13.69)	7.310	0.063[α]
Cholesterol (mg)	262.5 (176.46)	224.4 (248.05)	160.7 (161.16)	245.8 (123.08)	6.017	0.111[α]
Fiber (g) [a-c, a-d]	19.0 (6.08)	14.7 (9.07)	12.1 (6.24)	7.7 (11.15)	17.065	0.001*[α]
Vitamin A (µg) [a-b, a-c, a-d]	769.5 (545.85)	556.8 (482.1)	506.7 (274.07)	387.4 (289.42)	8.731	0.033*[α]
Thiamine (mg) [a-b, a-c, a-d, b-d]	0.8 (0.41)	0.5 (0.38)	0.5 (0.23)	0.3 (0.23)	20.470	0.000*[α]
Riboflavin (mg) [a-b, a-c, a-d]	1.3 (0.74)	0.8 (0.72)	0.7 (0.44)	0.5 (0.35)	21.099	0.000*[α]
Niacin (mg) [a-d]	9.3 (7.53)	6.4 (5.60)	6.2 (4.16)	4.6 (5.58)	8.365	0.039*[α]
Pyridoxine (mg) [a-c, a-d]	1.0 (0.52)	0.6 (0.53)	0.5 (0.36)	0.4 (0.66)	14.815	0.002*[α]
Folate (µg) [a-c, a-d]	322.1 (155.83)	200.9 (148.71)	173.3 (106.06)	137.4 (109.67)	11.448	0.010*[α]
Vitamin B$_{12}$ (µg)	2.5 (2.37)	2.6 (2.93)	1.7 (1.38)	1.9 (1.93)	5.627	0.131[α]
Vitamin C (mg)	87.5 (96.50)	55.7 (57.69)	52.2 (58.00)	50.6 (98.06)	3.696	0.296[α]
Vitamin E (mg)	13.6 (12.71)	10.0 (10.38)	7.4 (9.68)	4.8 (6.90)	7.770	0.051[α]
Sodium (mg) [a-d, b-d]	3963.1 (1973.85)	2915.4 (2095.06)	2460.8 (1384.84)	1373.9 (1309.17)	15.743	0.001*[α]
Potassium (mg) [a-b, a-c, a-d, b-d]	2415.1 (1040.60)	1642.4 (1013.51)	1418.2 (582.69)	1095.8 (845.98)	19.576	0.000*[α]
Calcium (mg) [a-c, a-d, b-d]	943.5 (510.44)	752.5 (577.62)	608.7 (383.43)	356.8 (392.20)	15.369	0.002*[α]
Magnesium (mg) [a-c, a-d, b-d]	240.8 (117.87)	186.7 (102.86)	154.1 (54.78)	98.8 (70.21)	21.754	0.000*[α]
Phosphorus (mg) [a-c, a-d, b-d]	975.7 (399.67)	751.6 (522.05)	619.1 (218.35)	483.8 (263.00)	20.445	0.000*[α]
Iron (mg) [a-b, a-c, a-d, b-d]	9.5 (4.62)	6.7 (3.91)	5.6 (2.59)	4.5 (2.64)	25.440	0.000*[α]
Zinc (mg) [a-c, a-d]	7.8 (3.91)	6.8 (4.92)	5.3 (1.60)	4.2 (3.71)	15.900	0.001*[α]

Significant differences are indicated as exponent. [α] Kruskal Wallis test [β] One Way ANOVA test was used. *p<0.05

PUFA: poly unsaturated fatty acid, MUFA: mono unsaturated fatty acid, SFA: saturated fatty acid

The correlation between the age, the duration of CKD, anthropometric measurements, blood pressures, biochemical parameters, energy and nutrient intakes of the individuals participating in the study, and the number of PEW criteria met by the individuals were given in Table 5. Accordingly, the number of PEW criteria met by individuals; had a negative correlation with BW, BMI, UMAC, TSFT, BFP, total protein and albumin levels ($p<0.05$). In addition, in the evaluation made in terms of energy and nutrients, it was determined that there was a significant correlation between all parameters except cholesterol and vitamin C and the number of PEW criteria that individuals met ($p<0.05$).

Table 5. Correlation of the number of PEW criteria met with various variables

Variables	Number of PEW criteria met		Biochemical parameters	Number of PEW criteria met	
	r	p		r	p
Age (year)	-0.095	0.304	Blood glucose(mg/dL)	-0.150	0.105
Duration of CKD	-0.130	0.159	TC (mg/dL)	-0.164	0.172
			LDL-C (mg/dL)	-0.030	0.803
Energy and nutrients			HDL-C (mg/dL)	-0.156	0.194
Energy (kcal)	-0.340	0.000*	Triglyceride (mg/dL)	0.095	0.433
Carbohydrates (g)	-0.197	0.032*	Total protein (g/dL)	-0.310	0.001*
Protein (g)	-0.394	0.000*	Albumin (g/dL)	-0.307	0.001*
Total fat (g)	-0.292	0.001*	Urea (ng/dL)	0.096	0.300
PUFA (g)	0.236	0.010*	Uric acid (mg/dL)	0.023	0.813
MUFA (g)	-0.291	0.001*	Creatinine (mg/dL)	0.145	0.115
SFA (g)	-0.234	0.010*	Iron (µg/dL)	0.008	0.955
Cholesterol (mg)	-0.151	0.100	TIBC (µg/dL)	-0.031	0.840
Fiber (g)	-0.364	0.000*	Ferritin (ng/mL)	0.189	0.175
Vitamin A (µg)	-0.255	0.005*	PTH (pg/dL)	-0.065	0.651
Thiamine (mg)	-0.239	0.009*	Sodium (mEq/L)	0.015	0.873
Riboflavin (mg)	-0.384	0.000*	Potassium (mEq/L)	-0.113	0.222
Niacin (mg)	-0.404	0.000*	Calcium (mg/dL)	-0.137	0.144
Pyridoxine (mg)	-0.243	0.008*	Phosphorus (mg/dL)	-0.014	0.886
Folate (µg)	-0.340	0.000*	Magnesium (mg/dL)	-0.189	0.075
Vitamin B$_{12}$ (µg)	-0.298	0.001*	CRP (mg/dL)	0.059	0.626
Vitamin C (mg)	-0.213	0.020*	GFR (mL/dk/1.73 m²)	-0.044	0.637
Vitamin E (mg)	-0.090	0.329	**Anthropometric measurements. blood pressures**		
Sodium (mg)	-0.330	0.000*	BW (kg)	-0.328	0.000*
Potassium (mg)	-0.386	0.000*	BMI (kg/m²)	-0.523	0.000*
Phosphorus (mg)	-0.410	0.000*	UMAC (cm)	-0.569	0.000*
Calcium (mg)	-0.358	0.000*	TSFT (mm)	-0.279	0.002*
Iron (mg)	-0.443	0.000*	BFP (%)	-0.467	0.000*
Magnesium (mg)	-0.419	0.000*	LBM (kg)	0.053	0.564
Zinc (mg)	-0.364	0000*	SBP (mmHg)	-0.068	0.461
			DBP (mmHg)	-0.012	0.896

Spearman correlation was used.   *p<0.05

According to the results of linear regression analysis for parameters with statistically significant correlation in Table 5, it was determined that BMI (26.8%) and BFP (25.5%) from anthropometric measurements, albumin level (18.6%) from biochemical parameters, protein (12.7%) and fiber (14.1%) from macronutrients, and magnesium (15.7%) and thiamine (15.0%) from micronutrients; were the most explain parameters the number of PEW criteria met by individuals (Table 6) (p<0.05).

Table 6. Linear regression with number of PEW criteria met

	B	%95 (CI)	β	R²	p
BW (kg)	-0.017	-0.027- -0.007	-0.311	0.097	0.001*
BMI (kg/m²)	-0.077	-0.100- -0.053	0.518	0.268	0.000*
UMAC (cm)	-0.034	-0.049- -0.018	-0.368	0.135	0.000*
TSFT (mm)	-0.036	-0.056- -0.015	-0.309	0.095	0.001*
BFP (%)	-0.040	-0.052- -0.027	-0.505	0.255	0.000*
Total protein (g/dL)	-0.047	-0.067- -0.027	-0.410	0.168	0.000*
Albumin (g/dL)	-0.070	-0.097- -0.043	-0.432	0.186	0.000*
Energy (kcal)	-0.001	-0.001- 0.000	-0.360	0.130	0.000*
Carbohydrates (g)	-0.003	-0.006- -0.001	-0.273	0.074	0.003*
Protein (g)	-0.012	-0.017- 0.000	-0.357	0.127	0.000*
Total fat (g)	-0.008	-0.013- - 0.003	-0.295	0.087	0.001*
PUFA (g)	-0.019	-0.037- -0.001	-0.189	0.036	0.039*
MUFA (g)	-0.023	-0.036- -0.011	-0.319	0.102	0.000*
SFA (g)	-0.014	-0.026- -0.002	-0.203	0.041	0.027*
Fiber (g)	-0.049	-0.071- -0.027	-0.375	0.141	0.000*
Vitamin A (µg)	-0.009	0.000-0.000	-0.058	0.003	0.534
Vitamin E (mg)	-0.015	-0.030-0.000	-0.186	0.034	0.043*
Thiamine (mg)	-1.184	-1.699- -0.668	-0.387	0.150	0.000*
Riboflavin (mg)	-0.285	-0.466- -0.105	-0.278	0.077	0.002*
Niacin (mg)	-0.026	-0.045- -0.007	-0.241	0.058	0.008*
Pyridoxine (mg)	-0.587	-0.927- -0.247	-0.301	0.091	0.001*
Folate (µg)	-0.002	-0.003- -0.001	-0.261	0.068	0.004*
Vitamin B₁₂ (µg)	-0.007	-0.020-0.007	-0.090	0.008	0.330
Sodium (mg)	0.000	0.000-0.000	-0.355	0.126	0.000*
Potassium (mg)	0.000	-0.001-0.000	-0.360	0.130	0.000*
Phosphorus (mg)	-0.001	-0.001-0.000	-0.383	0.147	0.000*
Calcium (mg)	-0.001	-0.001-0.000	-0.333	0.111	0.000*
Iron (mg)	-0.080	0.116- -0.044	-0.376	0.142	0.000*
Magnesium (mg)	-0.004	-0.006- -0.002	-0.397	0.157	0.000*
Zinc (mg)	-0.077	-0.115- -0.038	-0.341	0.116	0.000*

*p<0.05

Discussion

Malnutrition is a common condition in CKD[3], and it has been determined that the incidence of malnutrition in CKD varies between 28-65%, depending on the criteria used in the diagnosis[4, 17-19]. However, most of the studies have been performed in CKD patients with end-stage renal disease or on dialysis[5, 20-25] and there are limited studies evaluating nutritional status in the early stages of CKD[26-28]. Malnutrition seen in CKD, causes negative consequences such as increased disease severity and the risk of disease-related morbidity and mortality[29] and it has been stated that the use of various methods together is more effective than evaluating the malnutrition status with a single method in individuals with CKD[3]. Nutritional levels of the individuals participating in this study were evaluated with SGA and PEW. SGA, which is an independent predictor of all-cause mortality in CKD, is a practical, non-invasive and inexpensive composite tool that is widely used in clinical practice[30]. PEW is considered an important parameter in CKD because it is associated with increased morbidity and mortality and decreased quality of life[31]. In this study, it was determined that 20.2% of the individuals had moderate/severe malnutrition according to SGA and 8.4% with PEW. At the same time, it was determined that 7.7% of individuals in the 2nd stage of CKD, 8.1% of those in the 3rd stage, 10.0% of those in stage 4, and 8.3% of those in stage 5 had PEW; and the rate of PEW was higher in individuals with moderate and severe malnutrition according to the SGA assessment (Table 1) ($p>0.05$). In studies conducted with individuals with CKD who did not receive dialysis treatment, the incidence of PEW was found to be 11% by Cuppari et al.[32] and 9% by Hyun et al.[27] Also, in the study conducted by Sum et al.[33] with individuals receiving hemodialysis treatment, the frequency of PEW was determined as 21.1%, and in the evaluation made according to SGA, it was stated that the risk of PEW was found in 48.9% of the patients. According to studies in which PEW was evaluated based on CKD stages, in the study conducted by Hyun et al.[27] with individuals with predialysis CKD, the incidence of PEW was 4.4% in stage 2 of CKD, 8.3% in stage 3a, 6.2% in stage 3b, 15.6% in the 4th stage and 24.6% in the 5th stage; in the study conducted by Dai et al.[30] it was found that among individuals who did not receive dialysis treatment, it was 2% in those with CKD in stages 1 and 2, 16% in those in 3 and 4 stages, 31% in those in 5th stage, and 44% in those who received dialysis treatment; in the systematic review study conducted by Milovanova et al.[34] with individuals with predialysis CKD, 4.2% in stage 3b of CKD; 21.3% in stage 4; 74.5% in stage 5, but PEW was not seen in stages 2 and 3a. These data indicate that the risk of malnutrition as determined by PEW increases with increasing CKD stage. Therefore, it is thought that evaluating the nutritional status of individuals with CKD from the early stages and implementing necessary interventions will have a positive impact on disease prognosis. Assessing nutrition using tools such as PEW in the early stages and taking appropriate actions can help prevent muscle mass loss, decline in physical function, immune suppression, increased infection risk, and prolonged hospitalization. This approach can improve quality of life and reduce mortality risk in individuals with CKD.

While obesity is associated with high mortality in the general population, this relationship has not been clearly demonstrated in individuals with CKD who do not receive dialysis treatment[35]. In this context, in a study conducted with approximately 454

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thousand individuals, it was stated that BMI showed a U-shaped relationship with CKD prognosis. BMI <25 kg/m² has been associated with poor prognosis regardless of CKD severity. Additionally, it has been reported that adverse outcomes can be seen in the early stages of CKD in individuals with BMI ≥35 kg/m², and this relationship is weak in individuals with GFR <30 mL/min. Therefore, it was stated that the BW management of individuals with CKD should be carefully evaluated[36]. Also, since BMI is insufficient to distinguish between fat mass and lean body mass, it was stated that various anthropometric measurements such as TSFT[2,37] and UMAC should also be evaluated[2]. In this study, it was found that the number of PEW criteria met and BW, BMI, UMAC, TSFT and BFP levels changed significantly (Table 2), had a negative correlation (Table 5) and among these parameters, BMI (26.8%) and BFP (25.5%) were the parameters that most explained the number of PEW criteria met by individuals (Table 6) (p<0.05). Parallel to this study, in various studies conducted with individuals with CKD who did not receive dialysis treatment, it was stated that the number of PEW criteria met by the individuals and the levels of BW[26], BMI[11,26,27] BFP and UMAC[11] showed statistically significant differences. In a study conducted by Windahl et al.[38] with individuals in the 4th and 5th CKD stages, it was determined that PEW was seen at a rate of 29.3% and the BMI level of individuals with PEW was lower. Considering all these results, it was determined that anthropometric measurements are an effective parameter in the evaluation of PEW in individuals with CKD. For this reason, it is important and necessary to evaluate the anthropometric measurements of individuals with CKD at regular intervals and to take the necessary precautions depending on the results in the management of the disease and in increasing the quality of life of the patients.

PEW, which is characterized by a decrease in body protein mass and energy reserve, including muscle and fat mass and visceral protein pool, is a condition that is seen at a significantly in CKD and causes negative consequences[39]. Due to the activation of proinflammatory cytokines together with hypercatabolic mechanisms, the incidence of PEW increases as CKD progresses, and the nutritional status of individuals deteriorates with decreased appetite. This situation causes inadequate protein and energy intake as well as get worse in uremic parameters. Uremic metabolites causes complications such as oxidative stress, endothelial dysfunction, deterioration of nitric oxide homeostasis, renal interstitial fibrosis, sarcopenia, increased proteinuria and kidney dysfunction[9]. In this context, it is stated that the early evaluation of CKD patients who do not receive dialysis treatment for malnutrition is effective in fixing various metabolic disorders and reducing morbidity and mortality rates[3]. In this study, it was found that with the increase in the number of PEW criteria met, the serum total protein, albumin, calcium and magnesium levels decreased (Table 3); the PEW criteria number of the individuals had a negative correlation with the total protein and albumin levels (Table 5); and the number of PEK criteria met by individuals was explained by serum total protein level 18.6% and albumin level 16.8% (Table 6) (p<0.05). In various studies conducted with individuals with predialysis CKD, it was determined that CRP[11,26,27], GFR, albumin[11,26,27,40], TC[11], calcium and phosphorus[40] levels changed significantly according to the number of PEW criteria met. In a study conducted by Windahl et al.[38], with individuals aged 65 and over who did not receive dialysis treatment with a GFR level of ≤20 mL/min/1.73 m², it was stated that individuals with PEW had lower sodium and albumin levels (p<0.05). These

similar results support that there is a relationship between biochemical parameters, which are indicators of nutritional status, and PEW in CKD, and therefore PEW is a marker that can be used in the evaluation of nutritional status.

In individuals with CKD, holistic treatment has goals such as reducing the negative symptoms of uremia, prolonging the transition to dialysis treatment and improving quality of life[41]. In this context, it is stated that the nutritional interventions to be implemented are an important attempt to optimize the clinical outcomes of individuals with CKD[39], however the number of studies evaluating the nutritional status of individuals in the predialysis period is quite limited in the literature[41]. In addition, studies on food consumption of individuals with CKD who do not receive dialysis treatment generally evaluated energy and protein intake[26,27,42-44]. In a study, it was determined that there was a negative correlation between protein intake and creatinine and phosphate levels in individuals with CKD who do not receive dialysis treatment[41]. In the studies conducted by Hyun et al.[26] and Hyun et al.[27] it was stated that the protein intake of individuals decreased with the increase in the number of PEW criteria met ($p < 0.05$). In this study, it was detected that with the increase in the number of PEW criteria met, intake of energy and many macro and micronutrients decreased (Table 4), and the number of PEW criteria and parameters other than PUFA (g) intake had a negative correlation (Table 5) ($p < 0,05$). Furthermore, the parameters that most explain the number of PEW criteria met by individuals were protein (12.7%), fiber (14.1%), thiamine (15.0%) and magnesium (15.7%) (Table 6) ($p < 0.05$). These results reveal that the number of PEW criteria met in individuals with CKD is related to energy and nutrient intake, and importance of assessing nutritional status and making appropriate interventions in these individuals. In addition, this study differs from others in terms of evaluating the relationship between energy and protein intake and non-protein macronutrients and micronutrients with PEW.

Conclusions

In the literature, studies with individuals with CKD were mostly conducted with patients who received dialysis treatment, and studies on CKD patients who did not receive dialysis treatment are limited. Whereas appropriate interventions to be made with the correct evaluation of the nutritional status of the patients in the period before the dialysis treatment will be effective in prolonging the transition to dialysis treatment, reducing the cost of the disease, and increasing the quality of life. Therefore, using the PEW tool developed for individuals with CKD at regular intervals from the diagnosis of the disease is very practical and effective in the evaluation of malnutrition. In addition, it is important to raise awareness of health professionals such as nurses, dietitians, and doctors about the relationship between the nutritional status of individuals with CKD and the prognosis of the disease, to use practical and effective assessment tools and to take initiatives for this situation in cooperation.

Limitation of the Study

Evaluating one parameter from each PEW criterion category in the PEW evaluation is a limitation of the study.

Ethical Declarations

Ethical Committee Approval

The study was approved by the Ankara University Ethics Committee (Date: 18.06.2019, Decision No: 231) and the study was conducted in accordance with the principles of the Declaration of Helsinki.

Referee Evaluation Process

Externally peer-reviewed.

Conflicts of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Concept and Design: SK, AK; Data collection and processing: SK; Data analysis and interpretation: SK; Literature Review: SK; Writing the article: SK; Critical review: SK, AK.

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The Effects of Associated Impairments on Severity of Cerebral Palsy: Insights from a Single-Center

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Abstract

Aim: The aim of the study was to describe the distribution of the impairment index across Cerebral Palsy (CP) subtypes and Gross Motor Function Classification System (GMFCS) levels and investigate the relationship between CP subtypes, birth weight, gestational age, and the impairment index.

Method: This retrospective study was conducted with 423 children with CP aged between 0-18 years. Data were gathered from the medical records of children. Birth weight and week, functional classification levels, intellectual impairment, presence of vision, hearing problems, epilepsy recorded. All children were classified according to the GMFCS, Manual Abilities Classification System (MACS), Communication Function Classification System (CFCS), Eating and Drinking Abilities Classification System (EDACS), and CP subtypes. Participants were categorized according to Impairment Index (II) that consist of gross motor, intellectual, vision and hearing impairments and epilepsy. Multivariate backward modelling linear regression model was used to explain relations between impairment index and functional classification systems, birth weight and birth week.

Results: Amongst the 423 children (mean age 6.38±4.57 years) analyzed, 130 (30.7) of the children had low impairment, 159 (31.7%) of them had moderate impairment, and 134 (31.7%) of them had high impairment according to the II. In unilateral spastic type CP, 61.5% had a low impairment index (p<0.05), in bilateral spastic CP, 44.2% of children had a moderate impairment index (p<0.05), in dyskinetic CP 67.9% of children had a high impairment index (p<0.05). In ataxic type there were not any difference significantly between impairment index levels (p=0.06). As a result of regression analysis gross motor function level (Beta=0.85, p<0.01) and birth weight (Beta=-0.05, p=0.04) were predictors of the Impairment Index, and explained 73% of the variance.

Conclusion: Nearly one third of the children had high II; birth weight and gross motor functional level are the predictors of II. These results can help improve rehabilitation and social services.

Keywords: Cerebral palsy, physiotherapy, impairment, ICF.

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Serebral Palside Eşlik Eden Bozuklukların Serebral Palsi Şiddetine Etkisi: Tek Merkez Bulguları

Öz

Amaç: Çalışmanın amacı, Serebral Palsi (SP) alt tipleri ve Kaba Motor Fonksiyon Sınıflandırma Sistemi (GMFCS) seviyeleri arasında Bozukluk İndeksi (Bİ) dağılımını tanımlamak ve Bİ, SP alt tipleri, doğum ağırlığı ve doğum haftası arasındaki ilişkiyi incelemektir.

Yöntem: Bu retrospektif çalışma 0-18 yaş aralığında 423 SP'li çocukla yürütüldü. Veriler çocukların tıbbi kayıtlarından toplandı. Doğum ağırlığı ve haftası, fonksiyonel sınıflandırma seviyeleri, bilişsel bozukluk, görme, işitme sorunları, epilepsi varlığı kaydedildi. Tüm çocuklar GMFCS, El Becerileri Sınıflandırma Sistemi (MACS), Yeme ve İçme Becerileri Sınıflandırma Sistemi (EDACS), İletişim Fonksiyonu Sınıflandırma Sistemi (CFCS) ve SP alt tiplerine göre sınıflandırıldı. Katılımcılar, kaba motor, bilişsel, görme ve işitme bozuklukları ile epilepsiden oluşan Bİ'ye göre kategorize edildi. Bİ ile fonksiyonel sınıflandırma sistemleri, doğum ağırlığı ve doğum haftası arasındaki ilişkileri açıklamak multivariat doğrusal regresyon modeli kullanıldı.

Bulgular: Analiz edilen 423 çocuktan (ortalama yaş 6,38±4,57 yıl) Bİ'ye göre 130'unda (%30,7) düşük düzeyde bozukluk, 159'unda (%31,7) orta düzeyde bozukluk ve 134'ünde (%31,7) yüksek düzeyde bozukluk saptandı. Unilateral spastik SP'li çocukların %61,5'inde düşük düzeyde Bİ (p<0,05), bilateral spastik SP'li çocukların %44,2'sinde orta düzeyde Bİ (p<0,05), diskinetik SP'li çocukların %67,9'unda yüksek düzeyde Bİ p<0,05) saptandı. Ataksik tipte ise Bİ düzeyleri arasında anlamlı bir fark yoktu (p=0,06). Regresyon analizi sonucunda kaba motor fonksiyon düzeyi (Beta=0,85; p<0,01) ve doğum ağırlığının (Beta=-0,05; p=0,04) Bİ'nin yordayıcıları olduğu ve varyansın %73'ünü açıkladığı görüldü.

Sonuç: Çocukların yaklaşık üçte biri yüksek Bİ'ye sahipti; doğum ağırlığı ve kaba motor fonksiyonel seviyesi Bİ'nin prediktörleridir. Bu sonuçlar, SP'de rehabilitasyona yönelik yaklaşımların geliştirilmesine ve sosyal hizmetlerin iyileştirilmesine yardımcı olabilir.

Anahtar Sözcükler: Serebral palsi, fizyoterapi, bozukluk, ICF.

Introduction

Cerebral palsy (CP) is the most prevalent cause of physical disability of childhood and defined as a group of lifelong non-progressive disorders that impact the development of posture and movement in the developing brain and resulted by activity limitation[1,2].

CP characterized by motor function, posture and communication[3] impairments; moreover, associated problems like epilepsy and intellectual impairment as well as impairments of hearing and vision are common. The degree of these impairments varies from mild to severe inability[4].

With use of the International Classification of Functioning, Disability and Health (ICF) framework, professionals started to apply the ICF framework both for interventions and research purposes[5] and the influence of impairments of bodily structure and functions on social as well as personal life is understood better in accordance with the ICF framework. In those with CP, beside to CP definition, based on motor function and its neurological frame, the existence or lack of associated impairments significantly affect participation and as well as well-being[6].

Although the prevalence of associated problems in people with CP varies according to the various surveillances, common associated impairments are intellectual disability within the range of 30–50%, epilepsy within 15-55%, vision within 10–100% and hearing impairment 30–40%. The prevalence of associated problems according to various

functional levels in CP is unclear. Therefore, investigation among functional state and associated problems in CP can be helpful for planning proper intervention programs[7].

CP has been classified using a combination of the motor characteristics as well as classification systems such as the Gross Motor Function Classification System (GMFCS), the Manual Ability Classification System (MACS), the Communication Function Classification System (CFCS), and the Eating and Drinking Ability Classification System (EDACS). On the other hand, these classification systems explain functional capacity for each single ability, such as gross motor abilities, manual abilities or communication rather than severity level. There is no commonly agreed definition of "severe CP", definitions may refer to motor function only or to multiple impairments[8]. Therefore, recently, in order to evaluate the level of impact in people with CP together with motor, cognitive, and associated impairments, the "impairment index" has been defined, which evaluates the motor involvement severity, the associated impairments presence, and cognitive inadequacy together and defines the impact of CP on the child as mild, moderate, and severe impairment[6].

This study analyses data hospital based data retrospectively and centered on the definition of CP based on the severity of impairment using the impairment index, which aims to describe impairments combination of as well as severity of these impairments. This study aims to describe the distribution of the impairment index across subtypes of CP and GMFCS levels, and evaluate the association between CP subtypes, birth weight, gestational age, and impairment index.

Material and Methods

This single-center retrospective study was completed at Hacettepe University, Faculty of Physical Therapy and Rehabilitation, between July 2020 - July 2022. Ethical approval for the study was gained from Hacettepe University, Ethical Committee of Non-invasive Clinical Researches (Number: GO 20/356; Date: 17.04.2020).

Study Population, Exclusion Criteria

Data of the study were collected from medical records of children. Inclusion criteria were being age <18 years, diagnosis of CP. Date of birth, birth weight and week, functional classification levels, intellectual impairment, presence of vision, hearing problems and epilepsy recorded. Children with missing any of these relevant records and any neurological, genetic, or metabolic disorders co-existence with CP were excluded.

Classification of Functional Abilities

The Turkish versions of GMFCS[9], MACS[10], CFCS[11], and EDACS[12] were used to classify the functional levels. All Turkish versions were valid and reliable[9-12].

Gross Motor Function Classification System (GMFCS): classifies motor functional abilities in CP. The distinction between levels are based on functional limitations, the necessity for hand-held aids or wheeled devices for mobility[9,13].

Manual Abilities Classification System (MACS): classifies the hand skills of children with CP, like object grasping and releasing in daily life within five levels[10,14].

Eating and Drinking Abilities Classification System (EDACS): classifies eating and drinking abilities in children with CP into five levels. EDACS aims to differentiate and classify the daily eating and drinking abilities in people with CP[12,15].

Communication Function Classification System (CFCS): classifies the communication function of people with CP in daily life within five levels (Level I−V)[11,16].

Cerebral Palsy Classification

CP subtypes was classified according to the classification of Surveillance of CP in Europe as unilateral spastic (US-CP) bilateral spastic (BS-CP), dyskinetic, and ataxic[17].

Associated Impairments

Intellectual impairment was determined according to the guidance research center of the Ministry of National Education; visual and hearing impairments, and epilepsy were recorded according to medical records of the last testing. In case of lack of medical reports, the patient excluded from the study.

Intellectual impairment was categorized into three intelligence quotient (IQ) categories or estimated IQ: normal/near-normal intellect (IQ>70), mild to moderate intellect (IQ between 50-69), and severe impairment of intellect (IQ<50)[6]. Impairments of vision and hearing were noted as the existence or non-existence. Presence of epilepsy, which is described as having two unprovoked seizures or receiving antiepileptic treatment, determined by a child neurologist according to medical reports.

Impairment Index

Impairment index consists of three levels according to the severity and impairment combinations.

Low impairment was defined as GMFCS Level I−II (able to walk without any support), IQ>70, neither impairment of visual nor hearing, and not having epilepsy.

High impairment was defined as GMFCS Level IV−V (inability to walk) and/or IQ<50 (severe impairment of intellect) with or without at least one of the impairments of visual, hearing, and active epilepsy.

Moderate impairment was defined as GMFCS Level I−II, IQ>70, but with one or more of the impairment of visual, hearing, and active epilepsy; or being GMFCS Level I−II with an IQ between 50-70, with or without at least one of the impairment of visual, hearing, and active epilepsy; or GMFCS Level III (walking with support), with an IQ<50 with or without one or more of the impairment of visual, hearing, and active epilepsy[6].

Statistical Methods

The Statistical Package for Social Sciences (SPSS) software version 21.0 was used. Categorical variables were given as numbers and percentages. Chi-square test was used as appropriate for measurement of relations. Multivariate backward modelling linear regression model was used to explain relations between impairment index and functional classification systems, birth weight and birth week.

Results

423 children with CP who met the inclusion criteria included. Majority of children, 76.6% (n=324) were spastic type (unilateral and bilateral), following dyskinetic (n=78, 18.4%),

and 5% (n=21) were ataxic. The social and demographic properties are presented in Table 1.

Table 1. Social and demographic properties of participants

Social and demographic properties		Mean±Standard Deviation (min – max)	
Age (years)		6.38±4.57 (2-18)	
Birth Week		35.40±4.63 (23 – 43)	
Birth Weight (grams)		2541.83±929.36 (660 – 5750)	
Gender	Female n (%)	179 (42.3)	
	Male n (%)	244 (57.7)	
Clinical Type		n	%
Unilateral Spastic		109	25.8
Bilateral Spastic		215	50.8
Dyskinetic		78	18.4
Ataxic		21	5.0

n, number; % percentage

Among classification systems, according to the GMFCS, 23.6% (n=100) were level 1, 27.0% (n=114) were level II, 18.9% (n=80) were level III, 16.3% (n=69) were level IV and 14.2% (n=60) were level V; according to the MACS, 41.8% (n=117) were level 1, 23.9% (n=101) were level II, 13.9% (n=59) were level III, 12.3% (n=52) were level IV and 8.0% (n=34) were level V. According to the CFCS, 57.7% (n=224) were level 1, 14.9% (n=63) were level II, 13.9% (n=59) were level III, 7.8% (n=33) were level IV and 5.7% (n=24) were level V and according to the EDACS, 64.8% (n=274) were level 1, 15.1% (n=64) were level II, 9.9% (n=42) were level III, 4.5% (n=19) were level IV and 5.7% (n=24) were level V.

The distribution of GMFCS, MACS, CFCS and EDACS according to clinical types are presented in Table 2.

Table 2. Distribution of GMFCS, MACS, CFCS and EDACS according to clinical types

Clinical type		GMFCS n (%)	MACS n (%)	CFCS n (%)	EDACS n (%)
Unilateral spastic (n=109)	Level I	63 (57.8)	56 (51.4)	91 (83.5)	100 (91.7)
	Level II	43 (39.4)	34 (31.2)	15 (13.8)	5 (4.6)
	Level III	3 (2.8)	17 (15.6)	3 (2.8)	4 (3.7)
	Level IV	-	2 (1.8)	-	-
	Level V	-	-	-	-
Bilateral spastic (n=215)	Level I	30 (14.0)	102 (47.4)	121 (56.3)	140 (65.1)
	Level II	45 (20.9)	42 (19.5)	27 (12.6)	29 (13.5)
	Level III	67 (31.2)	25 (11.6)	32 (14.9)	18 (8.4)
	Level IV	39 (18.1)	25 (11.6)	19 (8.8)	13 (6.0)
	Level V	14 (15.8)	21 (9.8)	16 (7.4)	15 (7.0)
Dyskinetic (n=78)	Level I	3 (3.8)	8 (10.3)	14 (17.9)	18 (23.1)
	Level II	15 (19.2)	17 (21.8)	20 (25.6)	25 (32.1)

	Level III	5 (6.4)	15 (19.2)	22 (28.2)	20 (25.6)
	Level IV	29 (37.2)	25 (32.1)	14 (17.9)	6 (7.7)
	Level V	26 (33.3)	13 (16.7)	8 (10.3)	9 (11.5)
Ataxic	Level I	4 (19.0)	11 (52.4)	18 (85.7)	16 (76.2)
(n=21)	Level II	11 (52.4)	8 (38.1)	1 (4.8)	5 (23.8)
	Level III	5 (23.8)	2 (9.5)	2 (9.5)	-
	Level IV	1 (4.8)	-	-	-
	Level V	-	-	-	-

n, number; % percentage

Associated impairments and gross motor function in overall CP. Among all the participants, 214 (50.6%) were walking without support (GMFCS Level I-II), 80 (18.9%) was walking with support (GMFCS Level III), and 129 (30.5%) of children were GMFCS Level IV-V. Most of the cases (n=231, 54.6%) had an IQ of 70 (normal intellect), following 135 (31.9%) an IQ between 50-69, and 57 (13.5%) an IQ of < 50. Impairment of the vision was in 133 (31.4%) of children, and impairment of hearing was in 23 (5.4%) of children. Overall, 103 (24.3%) had epilepsy. According to the Impairment Index, 130 (30.7) of the children had low impairment, 159 (31.7%) of them had moderate impairment, and 134 (31.7%) of them had high impairment. The frequency of categories according to the Impairment Index and associated impairments according to the CP subtypes were presented in Table 3.

Table 3. Impairment Index and associated impairments in CP subtypes

		Unilateral Spastic n (%)	Bilateral Spastic n (%)	Dyskinetic n (%)	Ataxic n (%)
Impairment Index	**Low**	67 (61.50)	43 (20.0)	10 (12.8)	10 (47.6)
	Moderate	42 (38.50)	95 (44.20)	13 (16.7)	9 (42.9)
	High	-	77 (35.80)	53 (67.9)	2 (9.5)
Gross Motor Function	**Level I-II**	106 (97.2)	75 (34.9)	18 (23.1)	15 (71.4)
	Level III	3 (2.8)	67 (31.2)	5 (6.4)	5 (23.8)
	Level IV-V	-	73 (34.0)	55 (70.5)	1 (4.8)
Intellectual	**IQ <50**	-	36 (16.7)	20 (25.6)	1 (4.8)
	IQ 50-70	20 (18.3)	66 (30.7)	45 (57.7)	4 (19.0)
	IQ >70	89 (81.7)	113 (52.6)	13 (16.7)	16 (76.2)
Visual	**Yes**	84 (22.0)	87 (40.5)	18 (23.1)	4 (19.0)
	No	85 (78.0)	128 (59.5)	60 (76.9)	17 (81.0)
Hearing	**Yes**	2 (1.8)	15 (7.0)	6 (7.7)	-
	No	107 (98.2)	200 (93.0)	72 (92.3)	21 (100.0)
Epilepsy	**Yes**	24 (22.0)	55 (25.6)	22 (28.2)	2 (9.5)
	No	85 (78.0)	160 (74.4)	56 (71.8)	19 (90.5)

n, number; % percentage

The results of the backward modelling linear regression analysis showed that among the independent variables, gross motor function level (Beta=0.85, p<0.01) and birth weight

(Beta=-0.05, p=0.04) were strong predictors of the Impairment Index, and explained 73% of the variance (Table 4).

Table 4. Results of regression analyses

Model: Multiple linear regression (backward modeling)						
Dependent variable	**Independent variable**	**B**	**Std. Error**	**Beta**	**p**	**R²**
Impairment Index	Step 1					
	Constant	0.902	0.183		.000	0.731
	Birth weight	-0.041	0.030	-0.053	0.172	
	Birth week	-0.002	0.007	-0.011	0.784	
	Clinical type	-0.022	0.030	-0.022	0.474	
	GMFCS	0.472	0.028	0.816	.000	
	MACS	-0.007	0.030	-0.012	0.813	
	EDACS	0.030	0.035	0.042	0.386	
	CFCS	0.025	0.030	0.039	0.404	
	Step 2					
	Constant	0.904	0.182		.000	0.732
	Birth weight	-0.042	0.030	-0.053	0.165	
	Birth week	-0.002	0.007	-0.011	0.774	
	Clinical type	-0.021	0.030	-0.021	0.487	
	GMFCS	0.469	0.024	0.811	0.000	
	EDACS	0.028	0.033	0.039	0.403	
	CFCS	0.024	0.030	0.037	0.421	
	Step 3					
	Constant	0.859	0.093		0.000	0.732
	Birth weight	-0.048	0.022	-0.061	0.029	
	Clinical type	-0.022	0.030	-0.022	0.470	
	GMFCS	0.470	0.024	0.812	.000	
	EDACS	0.026	0.033	0.037	0.418	
	CFCS	0.024	0.030	0.036	0.424	
	Step 4					
	Constant	0.836	0.088		.000	0.733
	Birth weight	-0.049	0.022	-0.063	0.023	
	GMFCS	0.464	0.023	0.802	0.000	
	EDACS	0.027	0.033	0.038	0.414	
	CFCS	0.024	0.030	0.037	0.414	
	Step 5					
	Constant	0.830	0.087		.000	0.733
	Birth weight	-0.047	0.021	-0.060	0.029	
	GMFCS	0.470	0.021	0.813	0.000	
	CFCS	0.038	0.024	0.058	0.116	
	Step 6					
	Constant	0.829	0.087		.000	0.732
	Birth weight	-0.044	0.021	-0.056	0.041	
	GMFCS	0.493	0.016	0.852	0.000	

Impairment index among to the CP subtypes varied significantly according to the Chi-Square test. In unilateral spastic CP, 61.50% of children had a low impairment index (p<0.05), in bilateral spastic CP, 44.2% of children had a moderate impairment index (p<0.05), in dyskinetic CP 67.9% of children had a high impairment index (p<0.05). In

ataxic type there were not a significant difference between impairment index levels (p=0.06) (Table 3).

Discussion

This study was a retrospective with a large population to understand the frequency of associated impairments among children with CP, especially targeting on the relatively numerous of children with CP, which gives the opportunity to investigate the effects of associated problems on all CP subtypes, as well as this study is one of the few studies, and in our knowledge the first study from Türkiye based on a novel classification, the impairment index which is in order to determine which children have relatively moderate or more severe impairment, it is important to characterize the combined effects of the many disabilities present in children with CP. This is because the children's needs and level of participation will be directly impacted by these.

Although the current study was not focused on the participation domain of ICF, according to the several studies, the effects of impairments on participation are well documented, and the influence of associated problems is significant and effects both function and participation of people with CP, and therefore it is ultimate to evaluate, understand, and follow the presence of impairments, such as motor, epilepsy, intellectual impairment as well as vision and hearing[18]. For instance, amongst factors affecting participation, gross motor function is the one of the most important factor in CP[19] and according to the Alghamdi et al[20]. (2017), Dang et al[21]. (2015), McManus et al. (2008)[22], and Colver, et al[23]. (2012) studies, motor skill is the major factor effecting participation of people with CP. Duke et al (2021) indicate that there is a relationship between comorbidities and limitation in school participation[24]. Similarly, according to study of Burgess et al., decrease of daily activity related with presence of an intellectual impairment; and epilepsy was associated with decrease of daily activity as well as self-care in CP[25]. Additionally, according to Crotti et al., (2024) within relation to motor function vision in daily life as manual abilities, and may influence the quality of life by limiting self-esteem, emotional and social well-being of these children[26]. Moreover, van Gorp et al. were well documented that factors in childhood account for 79−90% of the variation in participation of young adult in home life as well as interpersonal relationships of individuals with CP. Children with decreased motor capacity, intellectual disability or epilepsy are at risk for limitation in participation in young adulthood[27]. Therefore, as in current study, understanding impairments altogether is a key element to have opportunity enhancing participation in children with CP. Although classification systems like GMFCS, MACS, EDACS and CFCS are important tools for constitute common language to describe better and communicate about the largely heterogeneous functional skills of people with CP[8] there is not a consensus on definition of "severity of CP": definitions mostly refer a function as motor function only. Therefore, the Impairment Index provides a framework to describe the severity in a child with CP that closely related with participation.

In our study population sample, nearly one third of children (31.7%) were thus classified high impairment index level that will require comprehensive care and services to support because of this group has one or more associated severe impairment. One important finding of this study is that, when compared with spastic CP subtype, dyskinetic children

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have much more tendency to having severe impairments, with 67.9% of these children had a high impairment index. Dyskinetic CP is the second largest subtype of CP affecting 10–20% of children with CP[28] and consistent with current study severe motor impairment and intellectual impairment are more frequent in dyskinetic CP than in other subtypes[29].

According to the regression analysis, beside the GMFCS, birth weight is one of the predictors of the severity of CP in term of the Impairment Index. Esih et al., in their study found an inverse association between birth weight and CP developing risk[30].

Horber et al. found a weak relationship between severity and birthweight, as well as birth week, in our study, we found birth weight as the predictor but not birth week[6]. These contradictory results indicate more researches need to investigate relationship between impairments, birth week and weight. On the other hand, similar to current study, Delacy et al. analyzed the associated impairments and gross motor function levels and found that with increasing GMFCS level, the amount of people with CP with each associated impairment also increased[31].

The main limitation of the study was lack of changing severity by the time. Additionally, impact of etiological factors on severity should be investigated in future researches. Another limitation was, although the study based on such a large sample size, participants of the study based on a single center, therefore multicenter studies need for covering whole country.

Conclusion

In conclusion, according to the findings, dyskinetic subtype of CP is more severe form with bilateral spastic CP. Since, CP is a lifelong condition characterized by changes in function across the lifespan; the importance of interventions to improve outcomes in motor disorders associated with the condition[32]. Therefore, understanding the effects of associated impairments is important to organize and planning rehabilitation as well as social services. Clinical use of the disability index may guide effective and multidisciplinary rehabilitation practices. In the future studies it is recommended that to evaluate the effects of different disability levels of the disability index on activity and participation according to the ICF perspective.

Conflict of Interest: Authors declare that no conflict of interest.

Ethical Approval: Gathered from Hacettepe University, Non-invasive Clinical Researches Ethical Committee (Number: GO 20/356; Date: 17.04.2020).

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The Mediating Role of Mukbang in the Association between Loneliness and Smartphone Addiction in Emerging Adulthood

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Abstract

Aim: The purpose of this study is to examine the mediating role of Mukbang viewing behavior in the relationship between loneliness and smartphone addiction in individuals in the emerging adulthood period. Recently, an important field of study has emerged due to the effects of loneliness on behaviors in technological environments and the examination of Mukbang videos on the mental health of individuals. In this context, the aim of this study is to examine smartphone addiction by exhibiting Mukbang viewing behavior in those experiencing loneliness.

Method: In this study conducted with 401 participants, 280 females (69.8%) and 121 males (30.2%), the average age of the participants is 24.443 years (age range = 18-26, SD = 1.682). Within the scope of the study, data were collected from the participants face-to-face using the UCLA Loneliness Scale, Smartphone Addiction Scale, and Mukbang Addiction Scale. Conditional process analysis was performed using the SPSS PROCESS macro plugin in the analysis of the data. Additionally, the statistical significance of the mediating variable was examined using the bootstrapping method.

Results: Correlation results indicated that there was a significant and positive relationship between all variables. Findings from the conditional process analysis suggest that Mukbang serves as a partial mediator in the connection between loneliness and smartphone addiction.

Conclusion: The study reveals that Mukbang videos are used as a tool to cope with the feeling of loneliness of individuals and that this situation triggers smartphone addiction. The results demonstrate that intervention programs for conscious media use should be developed for individuals with high feelings of loneliness.

Keywords: Loneliness, Mukbang, smartphone addiction, emerging adulthood.

Beliren Yetişkinlikte Yalnızlık ile Akıllı Telefon Bağımlılığı Arasındaki İlişkide Mukbang'in Aracı Rolü

Öz

Amaç: Bu çalışmanın amacı, beliren yetişkinlik dönemindeki bireylerde yalnızlık ile akıllı telefon bağımlılığı arasındaki ilişkide Mukbang izleme davranışının aracı rolünü incelemektir. Son dönemde yalnızlığın teknolojik ortamdaki davranışları etkilemesi ve Mukbang videolarının bireylerin ruh sağlığı üzerine incelenmesi nedeniyle önemli bir çalışma alanı oluşmuştur. Bu bağlamda, yalnızlık yaşayanların Mukbang izleme davranışı sergileyerek akıllı telefon bağımlılığının incelenmesi bu araştırmada hedeflenmektedir.

Yöntem: 280 kadın (%69,8) ve 121 erkek (%30,2) olmak üzere 401 katılımcı ile gerçekleştirilen bu araştırmada katılımcıların yaş ortalaması 24.443'tür (Yaş aralığı = 18-26, Ss = 1,682). Araştırma kapsamında UCLA Yalnızlık Ölçeği, Akıllı Telefon Bağımlılığı Ölçeği ve Mukbang Bağımlılık Ölçeği kullanılarak katılımcılardan veriler yüz yüze toplanmıştır. Verilerin analizinde SPSS PROCESS makro eklentisi

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kullanılarak koşullu süreç analizi gerçekleştirilmiştir. Ek olarak, aracı değişkenin istatistiksel anlamlılığı bootstrapping yönteminden faydalanılarak incelenmiştir.

Bulgular: Korelasyon sonuçları, tüm değişkenler arasında anlamlı ve pozitif yönde ilişki olduğunu göstermiştir. Koşullu süreç analizinde ise, yalnızlık ile akıllı telefon bağımlılığı arasındaki ilişkide Mukbang'in kısmi aracı rol oynadığı saptanmıştır.

Sonuç: Araştırma sonucunda, Mukbang videolarının bireylerin yalnızlık duygusuyla başa çıkmada bir araç olarak kullanıldığını ve bu durumun akıllı telefon bağımlılığını tetiklediğini ortaya koymaktadır. Elde edilen sonuçlar, yalnızlık hissi yüksek bireyler için bilinçli medya kullanımına yönelik müdahale programlarının geliştirilmesi gerektiğini göstermektedir.

Anahtar Sözcükler: Yalnızlık, Mukbang, akıllı telefon bağımlılığı, beliren yetişkinlik.

Introduction

Human beings are inherently social creatures. Communicating with other people, socializing, and having social support resources are important gains for the mental health of individuals. Because people can develop their coping power and mechanisms thanks to the social relationships they establish. In contrast, loneliness is a negative emotional state that occurs due to inadequate social life[1,2]. When evaluated from this perspective, it can be said that loneliness is among the variables that can negatively influence the mental health of individuals. The concept of loneliness is defined as an individual's inability to establish close relationships with his/her environment, unwillingness to establish close relationships, or having difficulty establishing close relationships[3]. Marangoni and Ickes emphasize three important points regarding loneliness[4]. The first of these is that loneliness is different from social isolation. In other words, the concept of loneliness is an individual-specific and subjective experience. The second important point is that loneliness can create a negative psychological state for the individual. The third and last important point is that loneliness is a condition that arises from a lack of social relationships. According to Rokach, loneliness does not only occur when individuals are lonely[5]. Even if there are many people around, the individual may experience a feeling of loneliness. Based on this, it can be concluded that the experience of loneliness and the state of being alone are distinct concepts. While being alone may be preferable, feelings of loneliness are often undesirable and damaging[6]. In other words, while loneliness may denote an undesirable experience, being alone may be preferable. For instance, individuals may prefer to be alone to think creatively, concentrate, or develop various skills[7]. This demonstrates that wanting to be alone should not be confused with experiencing the feeling of loneliness.

Cacioppo and Cacioppo express loneliness as a public health problem[8]. A study emphasizes that loneliness can have destructive effects on an individual's physiological health as well as their psychological health[9]. When studies on the psychological effects of loneliness are examined, depression[10], psychological distress[11], increased social isolation[12], and an increase in technology-based addictions[13-15] stand out. Recently, technology-based addictions have also been among the concepts frequently studied in the literature.

Technology-based addictions generally occur due to the internet, mobile phones, games, and various gaming tools. Internet technology serves as a tool for today's people to perform certain behaviors online[16]. These behaviors often include gaming, shopping, and

social networking. From this point of view, various applications on the internet can serve as a new branch for individuals experiencing loneliness. Individuals experiencing loneliness can try to cope with this feeling through internet-based applications.

One behavior that has recently attracted attention as a technology-based addiction is Mukbang. Mukbang, which has an increasing interest day by day, is an online experience in which an individual broadcasting on the internet eats a large amount of food while other individuals watch and comment on it[17,18]. Hawthorne states that thousands of people watch Mukbang videos today[19]. Considering today's frequency of smartphone and internet use, it is thought that this behavior may be more dominant in people who are lonely. So much so that Kırcaburun et al. emphasize that watching Mukbang can have an effect that reduces loneliness and social isolation[17]. Individuals who experience loneliness may tend to follow Mukbang broadcasts in order to relieve this feeling. Studies in the literature emphasize that the communication established between the broadcaster, called Mukbanger, and the viewer during the Mukbang broadcast eliminates loneliness and increases social satisfaction[20]. Similarly, Rosen defines this situation as electronic closeness, stating that communication established during online broadcasting can reduce the feeling of loneliness by strengthening the social relationships between the broadcaster and the audience[21]. Based on the findings of these studies, it can be concluded that loneliness plays a role in increasing the tendency to watch Mukbang content. Although there is no study in the literature examining the effect between these two concepts, studies on similar concepts partially support this idea[17,19,21].

Another technology-based addiction that can be caused by loneliness is smartphone addiction. In addition to serving as a means of communication, smartphones are advanced technological devices that provide various functions, including photography, video recording, gaming, and access to the internet and social media platforms. Many applications that were previously performed using multiple technological tools can now be performed using a single smartphone. Despite all these positive effects, smartphones can also have an addictive effect as a result of excessive and uncontrolled use. Research suggests that different dimensions of loneliness, such as emotional and social loneliness, may play distinct roles in the development of smartphone addiction. While emotional loneliness refers to the absence of close emotional bonds, social loneliness stems from a lack of broader social interactions. Individuals experiencing emotional loneliness may turn to smartphones for parasocial interactions or digital companionship, whereas those with social loneliness might engage more in social media and online communities to compensate for their isolation. Increasing desire to use the phone, restlessness when unable to reach the phone, inability to stop using the phone, and daily procrastination due to phone use are indicators of smartphone addiction[22,23]. Matar-Boumosleh and Jaalouk emphasize that smartphone addiction could be related to pathological problems such as depression, stress, and anxiety in individuals[24]. According to Horwood and Anglim, smartphone addiction has a reducing effect on well-being[25]. Pathological smartphone use can negatively influence individuals' daily work and cause maladaptive behaviors[26]. Fino and Mazetti also emphasize that, while smartphones offer numerous benefits that facilitate daily life, it is essential to consider their potential negative effects on mental health[27].

Individuals with high levels of loneliness are likely to use smartphones as a tool to relieve these feelings. Jiang et al. emphasized that loneliness can increase smartphone addiction[28]. Shen and Wang also reported results supporting the positive relationship between the two concepts[29]. Likewise, Mahapatra stated that loneliness is an important antecedent of smartphone addiction[30]. Considering the findings of all these studies in the literature, it can be concluded that there is a significant relationship between loneliness and smartphone addiction. In addition, the Mukbang viewing behavior that individuals engage in to combat loneliness can trigger smartphone addiction, as it is done via smartphone. Therefore, individuals who experience loneliness may experience smartphone addiction both because of these feelings and through Mukbang viewing behavior. When the relevant literature was examined, no study was found examining this relationship between the concepts. As Mukbang is a relatively recent concept in the psychology literature, research on this topic can significantly contribute to its conceptualization and theoretical understanding. This study can also reveal the effects of various variables that may have negative effects on the mental health of individuals. In this context, this study aims to examine the mediating role of Mukbang in the relationship between loneliness and smartphone addiction. For this purpose, answers to the following hypotheses will be sought:

H1. Loneliness significantly predicts smartphone addiction.

H2. Mukbang mediates the relationship between loneliness and smartphone addiction.

Material and Methods

The aim of the study was to examine the relationships between loneliness, Mukbang viewing behavior and smartphone addiction and to investigate the mediating role of Mukbang viewing behavior in the relationship between loneliness and smartphone addiction. This research was designed as a quantitative study based on the correlational survey design. This correlational survey design, which examines the relationship between multiple variables, includes predictor, predicted, and mediator variables[31]. In this study, loneliness was considered as the predictor variable, smartphone addiction as the predicted variable and Mukbang viewing behavior as the mediator variable. In this section, information about the study group, data collection tools, data collection process, and statistical analysis was shared, respectively.

Participants

The study group consisted of individuals in the emerging adulthood period. A total of 401 individuals participated in the study, 280 females (69.8%) and 121 males (30.2%). The age range of the group ranged from 18 to 26, and the mean age was 24.443 (*SD* = 1.682). When the perceived socioeconomic levels of the participants were examined, 47 individuals (11.7%) stated that it was very low, 38 individuals (9.5%) stated that it was low, 292 individuals (72.8%) stated that it was medium, and 24 individuals (6%) stated that it was high. In addition to this information, the participants' daily technology use levels were also examined. The findings revealed that 26 participants (6.5%) utilized technological tools for 0–2 hours daily, while 166 participants (41.4%) engaged with them for 2–4 hours. Additionally, 104 participants (25.9%) reported using these tools for

4–6 hours, 78 participants (19.5%) for 6–8 hours, and 27 participants (6.7%) for more than 8 hours per day.

Data Collection Tools

UCLA Loneliness Scale: This scale was developed by Hays and DiMatteo to determine the level of loneliness[32]. The responses given on the scale, which is scored in a four-point scale, range from "*never*" to "*always*". The scale, which has a total of eight items (e.g., "*I have no one to turn to*"), has two reverse scores. The scale consists of one dimension. After these reverse items are arranged, a total score can be obtained from the scale. Possible high scores that can be obtained from the scale indicate that the individuals have a high level of loneliness. It is seen that the factor structure of this scale, which was adapted to Turkish by Doğan et al. shows a good fit and the Cronbach alpha reliability coefficient is .72[33].

Smartphone Addiction Scale: This scale was developed by Kwon et al. to determine the level of smartphone addiction[34]. The responses on the scale, which is scored in a six-point scale, range from "*strongly disagree*" to "*strongly agree*". The scale, which has a total of 10 items (e.g., "*I disrupt my planned work due to using my smartphone*"), does not have any reverse items and a total score can be obtained. The scale consists of one dimension. High scores that can be obtained from the scale indicate a high level of smartphone addiction. The factor structure of the scale, which was adapted to Turkish by Noyan et al. shows an acceptable level of fit and the Cronbach alpha reliability value is .86[35].

Mukbang Addiction Scale: This scale was developed by Kırcaburun et al. to determine the level of Mukbang addiction[17]. The answers on the scale, which is scored in a five-point scale, range from "*very rarely*" to "*very often*". The scale has a total of six items (e.g., "*Have you spent a lot of time thinking about or planning to watch Mukbang in the past year?*") and does not have any reverse items. A total score can be obtained from this one-dimensional scale. Possible high scores that can be obtained from the scale mean that the level of Mukbang addiction is high. It has been reported that the factor structure of the scale is well-matched and the Cronbach alpha internal consistency coefficient is .87.

Data Collection Process

Data for this study were gathered in 2024 through a convenience sampling method. Researchers held face-to-face interviews with the participants, explaining the study's purpose and emphasizing their right to withdraw at any stage. Informed consent was obtained from all participants before they participated in the study, and no compensation was paid to the participants. The entire process was conducted voluntarily, strictly adhering to the principles of the Declaration of Helsinki This study was carried out with the approval of the Ethics Committee of National Defense University, dated 08/03/2023 and numbered E-54589112-824.99-2161053, and each step of the research was carefully monitored to ensure compliance.

Statistical Analysis

Within the scope of the research, first preliminary analyses and then correlation analysis were performed. Conditional process analysis was performed to test the mediation

relationship between the variables. This analysis was performed using the PROCESS Macro add-on developed by Hayes[36]. Conditional process analysis can be expressed as regression-based mediation analysis[37]. This approach examines the interaction between dependent and independent variables along with the contribution of mediating or moderating variables, allowing researchers to uncover more complex relationships so that they can see not only direct effects but also indirect effects under different conditions. Age, gender, and socioeconomic status were incorporated into the established model as covariates. Adding a covariance variable to the model aims to evaluate the actual relationship between the dependent and independent variables more accurately by removing potential confounding effects. Demographic variables such as age, gender, and socioeconomic status were included in the model due to their known effects in the literature, in case they distort the results. After the mediation analysis, the bootstrapping test, which is accepted as a contemporary approach, was applied[38]. In this study, in the bootstrapping analysis conducted to test the significance of the mediator variable Mukbang, 5,000 resampling confidence intervals were calculated. Hayes and Preacher emphasized that the absence of a zero value between the lower and upper limits of the confidence interval values indicates significance[38].

Results

First, preliminary analyses were conducted. In this context, descriptive statistics and Cronbach's alpha reliability values of the variables were calculated. Then, Pearson product-moment correlation coefficients of the variables determined to have normal distribution were determined and are shown in Table 1. As a result of the analysis, it was determined that loneliness was positively and significantly correlated with both Mukbang ($r = .215$, $p < .01$) and smartphone addiction ($r = .189$, $p < .01$). In addition, Mukbang was positively and significantly correlated with smartphone addiction ($r = .198$, $p < .01$).

Table 1. Mean, standard deviation, and correlation values of the variables of the study

Variables	Mean	*SD*	1	2
1. Loneliness	11.937	2.192		
2. Mukbang	6.975	1.426	.215*	
3. Smartphone Addiction	16.221	6.766	.189*	.198*

* $p \leq .01$, $n = 401$

Following these analyses, the hypothetical model established in line with the ultimate purpose of the research was tested with conditional process analysis and is shown in Figure 1.

Figure 1. The mediating role of Mukbang in the relationship between loneliness and smartphone addiction, $^* p \leq .05$
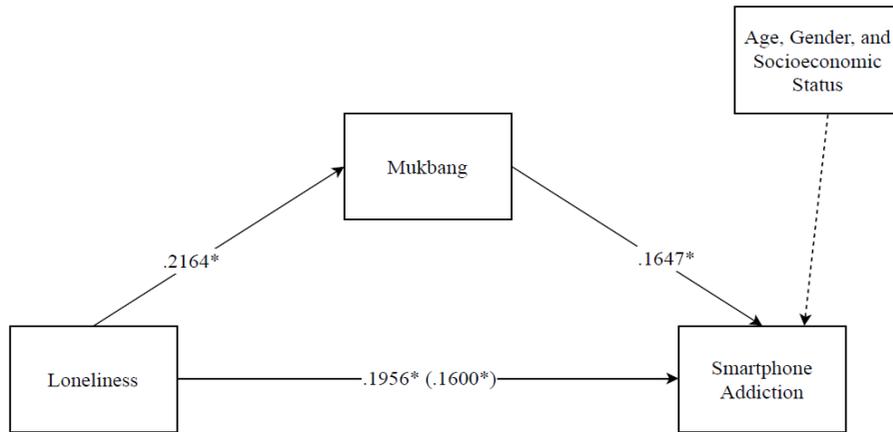
As seen in Figure 1, the path coefficient from loneliness to smartphone addiction was calculated as .1956 ($p < .05$). When Mukbang was included in this relationship, it was seen that the path coefficient from loneliness to smartphone addiction decreased to .1600 and statistical significance continued. The decrease in the path coefficient and the continued significance indicate that Mukbang plays a partial mediating role in the relationship between loneliness and smartphone addiction. In addition, the path coefficient from loneliness to Mukbang was calculated as .2164 ($p < .05$) and the path coefficient from Mukbang to smartphone addiction was calculated as .1647 ($p < .05$). All these findings demonstrate that Mukbang, like loneliness, plays an important role in explaining smartphone addiction.

After this analysis, the statistical significance of the mediator variable was examined by the bootstrapping method. This method is used to test the significance of the indirect effect in the established hypothetical model[39]. In the study, 5,000 resampling operations were performed to determine the significance of Mukbang. As a result of the analysis, it was determined that there was no zero value between the lower and upper limits in the 95% confidence interval, and therefore Mukbang had a statistically significant partial mediator role in the relationship between loneliness and smartphone addiction (bootstrap effect = .0356, 95% CI [.0072, .0721]).

Discussion

There is a side of human beings that feels and is affected by what they feel. Feeling lonely is one of the most individual-specific experiences and is one of the phenomena that can deeply influence a person. Investigating the effects of loneliness on people and revealing its negative effects on the individual is important for the psychology literature. When the literature is examined, it is possible to come across various studies indicating that loneliness causes various psychological problems[10,11]. One of the most notable of these problems is behavioral addictions caused by loneliness. With the advancement of technology in the 21st century, it is observed that there has been a serious increase in technology-based behavioral addictions in lonely people[13,14]. Smartphone addiction is also one of the types of addiction frequently observed in individuals experiencing loneliness today[30]. In this study, the relationship between loneliness and smartphone

addiction and the effect of Mukbang viewing behavior that may mediate this relationship were examined.

Individuals may turn to various alternative behaviors in order to escape the feeling of loneliness they experience. One of these alternative behaviors is watching Mukbang. Increasing the level of Mukbang viewing by an individual to interact and get rid of the feeling of loneliness may cause the time spent on the smartphone to become uncontrollable. Findings revealed that Mukbang viewing is an important concept that mediates the relationship between loneliness and smartphone addiction. These findings are discussed in detail below in the light of the literature.

The first finding of the study is that there is a positive relationship between loneliness and Mukbang. Research on the Mukbang variable, which is a new concept in the literature, reports that the number of people watching Mukbang is increasing day by day[19]. There is no study in the literature that directly examines the relationship between loneliness and Mukbang. Although studies on the concept of Mukbang are still very limited, indirect findings have been reached in a few different studies that suggest that individuals experiencing loneliness may be more likely to watch Mukbang. For instance, Kırcaburun et al. emphasize that watching Mukbang may be more common in individuals experiencing loneliness[17]. Mukbang viewing may reduce social isolation and loneliness, so Mukbang viewing may be more common in lonely individuals. Liu et al. stated that the interaction established during Mukbang broadcasts is good for the loneliness level of individuals; therefore, lonely individuals are more likely to watch Mukbang[20]. Rosen also emphasized that people who are lonely tend to watch more Mukbang[21]. Based on all these studies in the literature, it can be interpreted that loneliness is a variable that increases watching Mukbang. This suggests that Mukbang content may serve as a coping mechanism for individuals experiencing loneliness, fulfilling their social and emotional needs through virtual interactions.

The second finding of the study is that there is a positive relationship between loneliness and smartphone addiction. Feeling lonely leads individuals to behave differently. Individuals seek environments where they can interact with other people to escape the loneliness they feel, to socialize, or to express themselves. To achieve this, it requires various communication tools, social media applications, and the internet. Smartphones are devices that can meet this need in the most economical way. Many activities such as social media monitoring, participating in live broadcasts, and interacting in a virtual environment can be carried out with these devices, which work as mini computers. Individuals may spend more time on their smartphones to relieve the emotional burden of loneliness they feel. Studies in the literature indicate that loneliness is one of the variables that can increase smartphone addiction[28]. Hu and Xiang state that there is a positive relationship between loneliness and smartphone use[13]. Similar studies also emphasize this relationship between the two concepts[29,30]. These studies in the literature support the first finding of the study. Based on this, it can be concluded that loneliness is a variable that increases smartphone addiction. This highlights the importance of developing alternative social support mechanisms to reduce excessive smartphone use driven by loneliness.

The third and final finding of the study is that loneliness may increase Mukbang viewing and cause smartphone addiction. In other words, the relationship between loneliness and smartphone addiction is mediated by watching Mukbang broadcasts. People who struggle with the emotional burden of loneliness can develop different strategies to cope with it. As one of these strategies, a person may want to interact and relieve loneliness by participating in live broadcasts in the virtual environment. This is where the mediating effect of watching Mukbang comes into play. One can try to cope with the feeling of loneliness by watching broadcasts of people eating and engaging in various interactions. However, the motivations for watching Mukbang may vary across cultures. In many Asian societies, Mukbang is often associated with communal eating experiences, where viewers seek a sense of connection and shared dining, whereas in Western societies, it may be more linked to entertainment, curiosity, or even dietary control strategies. These cultural differences may shape how loneliness influences Mukbang consumption patterns and its subsequent impact on smartphone use. This step, which is essentially taken to get rid of a negative situation, can have a more negative impact on the individual when it gets out of control. A person who loses control over watching Mukbang may feel the need to watch more and more or interact in the virtual environment with each passing day. This may cause the individual to use the smartphone more or lose control over smartphone use. In short, it can pave the way for smartphone addiction. When the literature is examined, no studies on this triple relationship between the concepts are found. However, based on the indirect studies mentioned above, it can be said that watching Mukbang mediates the relationship between loneliness and smartphone addiction. This finding underscores the need for further research on digital consumption habits as potential coping mechanisms and their unintended consequences on mental well-being.

Based on all these research results, some implications should be mentioned. The findings obtained from this study offer important implications in terms of understanding the effects of digital consumption habits on individuals' psychosocial well-being. First of all, it has been revealed that loneliness can lead individuals to watch Mukbang and that this can serve a function of reducing social isolation. However, excessive consumption of such content can make individuals' coping mechanism for loneliness dependent on virtual environments. Similarly, the fact that loneliness is associated with smartphone addiction suggests that individuals may use digital environments as an escape or a means of establishing social connections. More importantly, the fact that Mukbang viewing behavior mediates the relationship between loneliness and smartphone addiction offers a new perspective on how digital consumption patterns play a role in coping with loneliness. In this direction, encouraging healthier social support mechanisms in coping with loneliness can reduce the risk of individuals developing digital addiction. In addition, developing awareness programs for the conscious and balanced management of digital content consumption can contribute to individuals establishing healthier relationships with digital environments. Future research can examine the dynamics between Mukbang viewing and smartphone addiction in more depth, revealing the long-term effects of these behaviors and possible intervention strategies.

Finally, there are some limitations of this study. First, the study examined the relationships among loneliness, Mukbang viewing, and smartphone addiction using cross-sectional data. Therefore, it is not possible to definitively determine the causal relationship between the variables; future studies can better analyze the direction of these relationships over time by using longitudinal designs. Second, Mukbang viewing habits and smartphone addiction were assessed using self-report scales. Data based on participants' self-reports may be susceptible to social desirability bias, which may lead to under- or over-reported usage. Third, the study was conducted with a specific sample group, and the demographic characteristics of this group may limit the generalizability of the findings. Replication with more diverse samples considering different age groups, cultural contexts, or psychosocial factors may increase the applicability of the findings to a wider audience. Finally, the type of Mukbang content and viewing motivations were not examined in detail. However, individuals' reasons for watching Mukbang may differ, and the effects of these motivations on the addiction development process should be addressed in more detail. Considering these limitations, it is recommended that future research use more comprehensive and methodologically diversified designs.

Conclusion

This study revealed that Mukbang viewing behavior plays a partial mediating role in the relationship between loneliness and smartphone addiction. The findings demonstrate that lonely individuals turn to Mukbang content to meet their need for social connection, which may increase smartphone use. These results provide important contributions to understanding the effects of time spent in digital environments on individuals' psychological well-being. In future studies, similar mediating effects of different media content can be examined, and strategies can be developed to combat digital addiction.

Consent to Participate: Informed consent was obtained from all the individual participants that were included in the study.

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The Effect of Artificial Intelligence on Clinical Practice and Learning Processes in Nursing Education: A Qualitative Study

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Abstract

Aim: The study was planned and carried out in a qualitative (case study) type in order to determine the areas of artificial intelligence use in nursing education and its effect on the learning processes of students.

Method: Demographic Data Form including the characteristics of nursing students and Semi-structured Interview Form were used as data collection tools. The data were collected with a voice recorder and transferred to a Microsoft Word file using a transcriber. The research data were evaluated by content analysis method and three expert opinions were obtained. MAXQDA program was used in the content analysis process.

Results: According to the results of the research, students mostly stated that they benefited from artificial intelligence tools, especially chatgpt. It was stated that chatgpt made significant contributions to conducting research, learning languages, obtaining drug information and obtaining information about applications. The students emphasized that AI should be supported with more reliable and updated sources and pointed out that information pollution should be reduced. In addition, a suggestion was made that AI should only draw data from reliable academic sources.

Conclusion: It was seen that AI makes significant contributions to the learning process, but some fundamental issues such as reliability and information pollution need to be addressed. Students offered several suggestions to make AI-supported education more reliable, simple and accessible.

Keywords: Artificial intelligence, artificial intelligence tools, nursing students.

Yapay Zekanın Hemşirelik Eğitiminde Klinik Uygulama ve Öğrenme Süreçlerine Etkisi: Nitel Çalışma

Öz

Amaç: Araştırma öğrencilerin hemşirelik eğitiminde yapay zeka kullanım alanlarını ve öğrenme süreçlerine etkisini belirlemek amacıyla niteliksel (olgu bilim) tipte planlandı ve gerçekleştirildi.

Yöntem: Araştırmada veri toplama aracı olarak hemşirelik öğrencilerinin özelliklerini içeren Demografik Veri Formu ve Yarı Yapılandırılmış Görüşme Formu kullanılmıştır. Veriler, ses kayıt cihazı ile toplanmış ve Microsoft Word dosyasına transkriptor yöntemiyle aktarılmıştır. Araştırma verileri, içerik analizi yöntemiyle değerlendirilmiş olup, üç uzman görüşü alınmıştır. İçerik analizi sürecinde MAXQDA programı kullanılmıştır.

Bulgular: Araştırma sonuçlarına göre, öğrenciler çoğunlukla yapay zeka araçlarından özellikle chatgpt'den faydalandıklarını ifade etmiştir. Chatgpt'nin, araştırma yapma, dil öğrenme, ilaç bilgisi edinme ve uygulamalar hakkında bilgi edinme konularında önemli katkılar sağladığı belirtilmiştir. Öğrenciler, yapay zekanın daha güvenilir ve güncellenmiş kaynaklarla desteklenmesi gerektiğini vurgulamış, bilgi kirliliğinin

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azaltılması gerektiğine dikkat çekmişlerdir. Ayrıca, yapay zekanın yalnızca güvenilir akademik kaynaklardan veri çekmesi gerektiği yönünde bir öneri geliştirilmiştir.

Sonuç: Yapay zekanın öğrenme sürecine önemli katkılar sağladığı, ancak güvenilirlik ve bilgi kirliliği gibi bazı temel sorunların ele alınması gerektiği görüldü. Öğrenciler, yapay zeka destekli eğitimin daha güvenilir, basit ve erişilebilir olması için çeşitli öneriler sundu.

Anahtar Sözcükler: Yapay zeka, yapay zeka araçları, hemşirelik öğrencileri.

Introduction

Artificial intelligence (AI) was first defined by John McCarthy as "the science and engineering of making intelligent machines, especially intelligent computer programs"[1]. According to this definition, artificial intelligence is defined as the mental activities called "intelligence" performed by humans and performed by machines. In computer science, artificial intelligence is defined as "devices containing intelligent agents that perceive their environment and take action to maximize their chances of success in a goal"[2], while nurses Fritz and Dermody, who have worked on artificial intelligence, define it as "a computer algorithm that acts as a rational agent that can evaluate human movement over time and make decisions about that person's movement, just as a human would"[3].

It is necessary to determine the dynamics affecting the redesign of nurses' processes of organizing and managing nursing care using AI product care systems. Artificial intelligence is thought to contribute to high-quality patient care, which is the core competence of nursing[4].

Artificial intelligence and nursing education According to the constructivist learning theory, students create their own knowledge by interpreting the information they have from what the instructor tells, what they hear, read and see. With the development of machines that can think, it is known that these skills belonging to humans can now also be done by machines[5]. In general, it is thought that artificial intelligence will play a major role in individualizing education, providing the right resources at the right time, and ensuring that human beings do not get lost in the information density that they cannot cope with[6].

Material and Methods

The study data were collected between December 15, 2024 and February 10, 2025. The sample of the study consisted of 10 nursing students who volunteered and agreed to participate in the study based on the literature. Each interviewed student was given a code name and these code names were used instead of the students' names in the analysis process.

Data Collection Tools

The data of this qualitative study, which aims to examine the use of artificial intelligence by students in nursing education, were collected using the "Demographic Data Form" and "Semi-structured Interview Form".

Data Evaluation

"The interviews with the participants were recorded using a voice recorder and transferred to a Microsoft Word file after obtaining their written and verbal consent. Three expert opinions were obtained and content analysis method was used in the study.

MAXQDA program was used for content analysis. The main purpose of content analysis is to find interrelated concepts that can explain the collected data. The basic process Content analysis is to collect similar data within the framework of certain concepts and themes and interpret them in a way that the reader can understand.

Ethical Aspects of the Research

Ethics committee permission was obtained from Istanbul Gelisim University Ethics Committee (Decision No: 2024-19-50) on November 29, 2024. "Informed Consent Form" was presented to all participants and their written and verbal consents were obtained.

Results

Table 1. Descriptive characteristics of the students (n:10)

Variables	n	%
Gender		
Female	3	30
Male	7	70
Place of Residence		
With Family	2	20
Dormitory	7	70
Student House	1	10
Reason for Choosing Nursing Profession		
Love for the Profession	1	10
Family Request	5	50
Job Opportunity	4	40
Purpose of Using the Internet		
Conducting Research	6	60
Communicating	4	40
Frequency of Using Artificial Intelligence Applications		
In between	3	30
2 a day	1	10
1 Hour	5	50
2 Hours	1	10

In the Table 1 the ages of the nursing students who participated in the study ranged between 21-23 years. It is seen that 70% of the students are male and 70% of them live in dormitories, while the rest live with their families or in student houses.

When the reasons for choosing a profession were examined, it was determined that 50% of the students preferred the nursing department with the guidance of their families, as well as job opportunities and love for the profession were also effective in the selection process.

When the internet usage habits of the students were evaluated, it was observed that the most common purpose of internet use was to conduct research, followed by communication and entertainment purposes. Although the duration of daily internet use varies from person to person, it is generally concentrated between 2 and 5 hours.

When the frequency of using artificial intelligence tools was evaluated, it was determined that some students used artificial intelligence supported applications on a daily basis, while others used them intermittently.

Qualitative Findings of the Participants

Theme 1: Artificial Intelligence Use Experiences

1.1. Artificial Intelligence Tools Used: Students stated that they most frequently used artificial intelligence tools such as ChatGPT and Siri. Some students also stated that they accessed different artificial intelligence applications such as Alexa and Gemini. Some students expressed their views as follows:

S2: Yes, I have used artificial intelligence opportunities. I mainly use Siri, I have it on my own device. I also use ChatGPT

S3: I generally use ChatGPT, but I also use Siri from time to time.

S8: Alexa, Siri, Gemini, ChatGPT. I use ChatGPT actively, but I do not trust ChatGPT very much.

1.2. Contribution of Artificial Intelligence Supported Educational Tools: Students stated that artificial intelligence tools enable them to access information faster and serve as a guide. It was stated that artificial intelligence contributed especially to research, language learning, medicine and application knowledge. Some students expressed their views as follows:

S2: I have always received education in a more useful way thanks to ChatGPT. Apart from that, I learned a new language on ChatGPT. My other test studies were also useful. I made my thesis more reinforcing by using those resources.

S3: Sometimes I use it for medicine applications. For example, sometimes I don't know exactly how and in which way they are used. Or I write on ChatGPT to learn other methods. I learn in detail from there.

S6: I mean, it helped me with research. Thanks to artificial intelligence, I can access information much more easily, which makes it much easier for me, whether it is clinical training or theoretical training. It contributes to me to gain skills.

Theme 2: The Role of Artificial Intelligence in Clinical Practice

2.1. Clinical Guidance and Access to Information: Most students see artificial intelligence as a guide in clinical education and state that it helps them complete the subjects they are missing. It was stated that artificial intelligence is a guide especially in drug applications and accessing information in patient care processes. Some students expressed their opinions as follows:

S1: When we look at it for general purposes, it is a guide. In a way, it tries to help us about the subject we do not know. At the same time, we use artificial intelligence here, such as drugs we don't know or side effects and so on.

S2: I generally see it as a guide. I thought it was very useful in my internship assignments. At the same time, I had the opportunity to complete the parts I was missing in ChatGPT. I find ChatGPT useful in that way.

S4: It guided me. I learned what I should do from those applications.

S9: The fact that it guides me and presents information in a more systematic way makes my job much easier. When I go to practice in the hospital, I will care for the patients, but sometimes I may be insufficient. In this case, I immediately get support from artificial intelligence and it is very useful.

2.2. *Improving Clinical Skills:* Students stated that thanks to artificial intelligence, they had the opportunity to improve their clinical skills by watching videos, conducting research and analyzing cases. It was stated that artificial intelligence contributed to the integration of theoretical knowledge into clinical practice. Some students expressed their opinions as follows:

S1: It helps me when I look at new researches or videos and sample applications.

S2: I found new research opportunities in the process of developing my clinical skills. I had the opportunity to reinforce the information I saw practically in the internship in theory. I identified different resources as a result of new research and I saw that these resources benefited me very efficiently in my career. I had the opportunity to watch videos on ChatGPT. I came across more different cases and I had the opportunity to discover the treatment methods of these cases thanks to ChatGPT.

S9: The theoretical knowledge I received at school was sometimes not enough. When I think that I will have difficulties in the clinic, I apply to artificial intelligence and it can provide me with the information I need very quickly. In this way, it is very useful for me in the clinic because I can reinforce what I know.

2.3. *Challenges in Clinical Practice:* Information pollution, reliability issues and the fact that some AI tools contain outdated or inaccurate information are the most frequently mentioned problems by students. In addition, some students also see the fact that AI charges fees for some of its services as an obstacle. Some students expressed their opinions as follows:

S2: I found that AI sometimes makes incorrect calculations in dose calculations. I realized that this data should be checked more precisely. So it is not only calculations according to AI. At the same time, I thought that these calculations should be checked by adding my own analytical skills. I mean, it was not right for me to say that this data is correct only based on artificial intelligence.

S3: For problems such as the lack of simplicity of information, information pollution, unnecessary information being given extra space.

S6: I did not encounter any difficulties, but the fact that it is paid after a certain point can make it difficult for me financially.

S9: It may not provide reliable and accurate information. In this sense, I can not always trust it.

Theme 3: Artificial Intelligence Supported Learning Processes

3.1. Impact on the Learning Process: Students stated that artificial intelligence positively affected their learning processes as it provided quick and easy access to information. In particular, it was stated that it saves time. Some students expressed their opinions as follows:

S4: I am positively affected. I have a better process because I access information more quickly.

S6: It is both easier and there is no waste of time. I learn faster.

S9: Because we save time directly. On the other hand, it also makes our work easier. Direct lecturing, summary does everything for us.

3.2. Areas where it is most useful: While some of the students argued that artificial intelligence is more useful in theoretical education, others stated that it also has important contributions in clinical education. It was stated that artificial intelligence is effective in terms of reinforcing theoretical knowledge and completing missing information. Some students expressed their opinions as follows:

S1: Of course theoretical. In clinical practice, we can often make mistakes. For this, I think it is theoretical.

S2: The most important useful part of artificial intelligence for me was the clinical practice part. As I have already stated, I had the opportunity to further reinforce the information I had reinforced during clinical practice in artificial intelligence. By watching videos, completing the deficiencies in my internship homework, I had the opportunity to complete unknown concepts and missing information.

S6: Theoretical. I get more information in theory.

S7: It is most useful for me in theoretical education. That is to say, since we do not see laboratory education properly, it provides convenience in theoretical terms at most.

3.3. Impact on Student Achievement: There is a widespread view that artificial intelligence increases student achievement. However, some students think that although artificial intelligence provides easy access to information, it can make the learning process passive and distract students from doing research. Some students expressed their views as follows:

S2: I partially believe that using artificial intelligence increases student achievement. Because the reason I say partially is this. Artificial intelligence is sometimes something useful and sometimes something that harms us. I mean, the useful part is that we can get the information immediately in a short and clear way. But the harmful part is this. It is an application that accustoms us to more comfort. I mean, artificial intelligence, okay, it is easy for us to access everything, but people now turn this into a comfort and offer the opportunity to develop themselves only in a certain part.

S5: I believe this because the cell phone in our hands is enough to learn information. Rather than asking anyone extra, we can learn the information quickly from the cell phone by asking the artificial intelligence in the way we want.

S6: I believe that it increases if it is used correctly. If you know what you are looking for, if you give the right commands, it can offer you most of the things you are looking for quickly. And you see that this positively affects your success.

Theme 4: Advantages and Challenges in Using Artificial Intelligence

4.1. Advantages

- Fast and easy access to information

- Guidance in clinical practice

- Reinforcement of theoretical knowledge

- Saving time

Some students expressed their views as follows:

S1: The biggest advantage is that it helps with theoretical knowledge and medicines we do not know.

S5: Access to fast information, time management, efficient and active use of time.

S7: As I said, the biggest advantages are that you can access theoretical knowledge more easily, it is more useful for us by seeing many things because it acts as a helpful guide in clinical practice.

4.2. Challenges and Barriers

- Information pollution and credibility issues

- Artificial intelligence can misrepresent some information

- Existence of outdated data

- Availability of AI applications that require paid access

Some students expressed their views as follows:

S5: Information pollution in general, too much information and some question marks about the security of information.

S9: The difficulties I encounter when using artificial intelligence are, again, as I said, they are usually paid. They ask for a fee after a usage experience and then we have difficulties as students.

S10: Information pollution, long texts.

Theme 5: Suggestions for the Development of Artificial Intelligence Supported Education

5.1. Information Reliability and Sourcing: Students suggest that AI should be supported by more reliable and updated sources. It was stated that information pollution should be reduced and AI should only draw data from reliable academic sources. Some students expressed their views as follows:

S1: Of course the security of the sources.

S3: Now we trust the sources, but I think the sources need to be improved a little bit. The information needs to be concise and simplified. Information pollution needs to be removed a little bit.

S6: I think the things that need to be improved are the accuracy of the information we research, the reliability of the sources and more opportunities can be provided in clinical applications.

S8: I think artificial intelligence applications can be developed to reach the right information.

S9: I think the reliability of the sources should be improved.

5.2. Simplified and Explanatory Information: Some students suggested producing simplified content because the information provided by AI is too long and complex. Some students expressed their opinions as follows:

S1: I prefer the information to be more simple and directly explanatory. So this is my suggestion.

S5: I can suggest that information security should be increased, information should be conveyed in a simpler, shorter way, and that it should provide the opportunity to access correct information.

S8: I suggest that they should be able to research not only the information obtained from Google but also various articles and magazines and give correct answers based on them.

5.3. Development of Artificial Intelligence Supported: Robot Students think that the use of artificial intelligence supported robots in patient care can alleviate the workload and contribute to vocational training. Some students expressed their opinions as follows:

S1: Of course, we need more information and support to take a better role in nursing education.

S2: I would like to get more information and support about the role of artificial intelligence in nursing education. Of course, I would like to get support on how to use artificial intelligence applications and how to access this information in a more useful way. If I learn this, my professional knowledge and experience will increase even more.

S7: In order to reduce the workload, I would like to make a suggestion in the form of developing artificial intelligence-supported robots. Because there is too much workload in hospitals today. At least we can see this in Türkiye. I believe that artificial intelligence-supported robots should be developed to lighten the manpower, that is, to lighten the workload.

Discussion

Nursing is known as a dynamic and rapidly developing field due to new technologies and changes in healthcare delivery models[7]. Nursing educators follow and adapt to the latest developments while maintaining their commitment to providing quality care[8]. In this study, students' views on the artificial intelligence areas utilized in nursing education were examined.

Nursing educators need to understand the potential uses, benefits, challenges, disadvantages and limitations of ChatGPT in order to make informed and effective decisions about the integration of ChatGPT into nursing education[9]. It has been reported that ChatGPT can provide contributions such as providing personalized learning

experiences to nursing students, helping students learn a new language, and identifying areas where they have difficulty[10]. In this study, results supporting the literature were obtained. Students stated that ChatGPT especially contributed to research, language learning, and acquiring knowledge of medication and practice.

Due to the accuracy limitations of the ChatGPT, students need to be wary of misinformation and have sufficient knowledge to check outputs against outcomes[9]. ChatGPT uses the database up to 2021, which limits its capacity to provide, summarize or synthesize accurate and up-to-date information. Nursing and healthcare are rapidly evolving and therefore new information after 2021 cannot be reflected[11]. In the study, students suggested that AI should be supported by more reliable and updated sources. They stated that information pollution should be reduced and AI should only draw data from reliable academic sources. It is thought to create information pollution for students who cannot distinguish between true and false information.

The students in our study were found to be widely supported in artificial intelligence applications in nursing education. Educators have important duties for students to access the right information from artificial intelligence tools. It is an important point that artificial intelligence-oriented course contents are delivered to students by well-equipped educators with guidance. There is also a need for studies to be carried out on the awareness or self-efficacy of educators on artificial intelligence and education.

Conclusion

In this study, how nursing students use artificial intelligence-supported educational tools, their effects on clinical and theoretical education processes and the difficulties they face were discussed. It was seen that artificial intelligence makes significant contributions to the learning process, but some basic problems such as reliability and information pollution need to be addressed. Students offered various suggestions to make AI-supported education more reliable, simple and accessible.

Limitations

Since this study is limited to nursing students studying at a university in Istanbul, the generalizability of the findings is limited.

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Surgical Team Members' User Evaluations on the Use of Safe Surgery Checklist^TR during Surgical Intervention

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Abstract

Aim: The Safe Surgery Checklist is a critical tool the World Health Organization developed to improve patient safety and reduce surgical errors. This study aimed to evaluate the opinions of surgical team members regarding using the Safe Surgery Checklist^TR during surgical intervention and to develop recommendations to improve their compliance.

Method: This cross-sectional and descriptive study was conducted with 334 healthcare professionals, including 162 nurses and 172 anesthesia technicians, working in Istanbul between January 02, 2024, and March 31, 2024. Data were collected using the Safe Surgery Checklist^TR Implementation Perception Questionnaire developed by the researchers in line with the literature and consisted of 33 items evaluating various elements of the checklist. Statistical analyses, including reliability tests (Cronbach's alpha) and descriptive statistics, were performed using the Statistical Package for the Social Sciences 26 program.

Results: The overall Cronbach's alpha value for the Safe Surgery Checklist^TR Implementation Perception Questionnaire was 0.966, indicating high reliability. Participants reported a mean score of 153.57±16.41, with a positive agreement rate of approximately 93%. The highest positive agreement was found for the item "Patient risk assessment should be performed" (98.8%) and the lowest agreement was found for confirming the necessity of prophylactic antibiotics (74.9%).

Conclusion: The study's results revealed that although awareness of the Safe Surgery Checklist^TR was high among team members, adherence to the practice varied, especially among less experienced and less educated staff. This highlights the need for education and communication strategies to improve adherence to the Safe Surgery Checklist^TR and increase patient safety and the importance of its successful implementation.

Keywords: Checklist, compliance, patient safety, quality of healthcare, surgical nursing.

Cerrahi Ekip Üyelerinin Cerrahi Girişim Sırası Güvenli Cerrahi Kontrol Listesi^TR Kullanımına İlişkin Kullanıcı Değerlendirmeleri

Öz

Amaç: Güvenli Cerrahi Kontrol Listesi, Dünya Sağlık Örgütü tarafından hasta güvenliğini artırmak ve cerrahi hataları azaltmak için geliştirilmiş kritik bir araçtır. Bu araştırmanın amacı, cerrahi ekip üyelerinin cerrahi girişim sırasında Güvenli Cerrahi Kontrol Listesi^TR'nin kullanımına ilişkin görüşlerini değerlendirmek ve uyumlarını artırmaya yönelik öneriler geliştirmektir.

Yöntem: Kesitsel-tanımlayıcı tasarımda gerçekleştiren bu çalışma, 02 Ocak 2024- 31 Mart 2024 tarihleri arasında İstanbul ilinde çalışan, 162 hemşire ve 172 anestezi teknisyeni/teknikeri olmak üzere 334 sağlık

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profesyoneli ile gerçekleştirildi. Veriler literatür doğrultusunda araştırmacılar tarafından geliştirilen, kontrol listesinin çeşitli öğelerini değerlendiren 33 maddeden oluşan Güvenli Cerrahi Kontrol Listesi[TR] Uygulama Algısı Anketi kullanılarak toplandı. İstatistiksel analizler, güvenilirlik testi (Cronbach's alpha) ve tanımlayıcı istatistikler dahil olmak üzere Statistical Package for the Social Sciences 26 programı kullanılarak yapıldı.

Bulgular: Güvenli Cerrahi Kontrol Listesi[TR] Uygulama Algısı Anketi için genel Cronbach alfa değeri 0,966 olup yüksek güvenilirliğe işaret etmektedir. Katılımcılar ortalama 153,57 ± 16,41 puan bildirmiş olup, pozitif uyum oranı yaklaşık %93'tür. En yüksek pozitif katılımın "Hastanın risk değerlendirmesi yapılmalıdır" maddesinde (%98.8), en düşük katılımın ise profilaktik antibiyotiklerin gerekliliğinin teyit edilmesinde (%74.9) olduğu belirlendi.

Sonuç: Araştırma sonuçları ekip üyeleri arasında Güvenli Cerrahi Kontrol Listesi[TR]'ye ilişkin farkındalığın yüksek olmasına karşın, özellikle daha az deneyimli ve eğitim seviyesi daha az çalışanlar arasında uygulamaya bağlılığın değişkenlik gösterdiğini ortaya koymaktadır. Bu durum, Güvenli Cerrahi Kontrol Listesi[TR]'ye uyumu iyileştirmek ve hasta güvenliğini artırmak için eğitim ile iletişim stratejilerine duyulan ihtiyacı ve başarılı bir şekilde uygulanmasının önemini vurgulamaktadır.

Anahtar Sözcükler: Kontrol listesi, uyum, hasta güvenliği, sağlık hizmeti kalitesi, cerrahi hemşireliği.

Introduction

Surgical errors are preventable and unintentional injuries that occur during the surgical process. These errors are not inherent risks of surgical procedures and can be prevented by effectively training healthcare professionals to ensure compliance with appropriate guidelines. Preventing high-impact but low-risk errors, such as foreign objects left in the body during surgery, mislabelled surgical specimens, and surgery on the wrong patient or at the wrong site, is critical to patient safety[1]. Analyses show that there are many reasons for surgical errors; factors such as poor communication, unnecessary or emergency procedures, inadequate training, and burnout among healthcare workers are among the common causes of surgical errors[2].

Performing the surgical procedure according to specific protocols is important to prevent adverse events[3]. To prevent such errors, the World Health Organization developed the Safe Surgery Checklist (SSC) in 2008, which consists of 19 items[3-7]. The use of this list has been reported to reduce major complications and contribute to patient safety[6,7].

In Turkey, the Ministry of Health adapted this list into a four-level, 30-item form and created the SSC[TR4,8]. The literature highlights the importance of assessing SSC in the operating theatre environment and recommends studies on the impact of high compliance on surgical complications[3,7,9,10]. Studies report that SSC has positive effects on patient safety, but there are different approaches to compliance with safety protocols[3,10,11]. These findings suggest that further research is needed to identify areas for improvement[7,12].

This study aimed to assess the opinions of surgical team members regarding the use of the SSC[TR] and to develop recommendations to improve their compliance.

Material and Methods

Type of Research

The study was conducted using a cross-sectional descriptive design. The study population comprised 334 healthcare workers based in Istanbul between January 02, 2024, and March 31, 2024.

Study Design and Participation

The study population comprised all anaesthesia technicians and nurses employed in Istanbul. Given the number of independent variables (33), the sample size was calculated to be 272, in line with the parameters of a 0.05 significance level, 95% power and an effect size of 0.15[13]. It was intended that at least 136 employees from each occupational group should be included in the research sample. The study sample comprised a total of 334 health professionals, of whom 162 were nurses and 172 were anaesthesia technicians.

Inclusion and Exclusion Criteria

To participate in the research, individuals must meet the following criteria:

- Be at least 18 years of age

- Voluntarily accept to take part in the research and give consent

- To be a nurse or anaesthesia technician.

Data Collection Tools

A series of five questions were posed to ascertain the identifying characteristics of the participants, age, occupation, education level, experience of working in a surgical clinic, and position in the unit where they were employed. The data were collected using the 'Safe Surgery Checklist TR Implementation Perception Questionnaire' (SSC[TR]-IPQ), which comprises 18 items about the SSC[TR] and 33 items covering the surgical intervention process, formulated by the extant literature[4,14].

Safe Surgery Checklist[TR] Implementation Perception Questionnaire (SSC[TR]-IPQ): The form developed by the researchers was reviewed by two specialist physicians in anesthesiology and reanimation, as well as a nurse academician, to obtain expert opinion. Additionally, based on expert opinion, the item related to the verification of the patient's identity information, the procedure, and the surgical site prior to the administration of anesthesia (item 10), as well as the items regarding the introduction of all surgical team members before the incision (items 17 and 18), were excluded from the scope of the study, as they were not open to evaluation or suggestion. Following the Safe Surgery Checklist[TR], the section entitled 'Before Leaving the Clinic' (comprising nine items) has been excluded from the present study, in line with the stated purpose of the investigation[8]. Accordingly, evaluation questions were prepared for the items included in the remaining 18 items out of the 21 items under the sections 'Before Anaesthesia', 'Before Surgical Incision' and "Before Exiting the Operation" in the SSC[TR]. The questionnaire was constructed with 33 items for evaluation and three sub-dimensions: Pre-Anaesthesia Practices (PAP), Pre-Operative Incision Practices (PIP) and Pre-Operative Discharge Practices (PDP). Each item was rated on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree), where higher scores indicate a more positive perception and stronger agreement with safe surgical practices. The total score for the SSCTR-IPQ was obtained by summing the responses to all 33 items, resulting in a possible score range from a minimum of 33 to a maximum of 165 points. Each sub-dimension score was calculated by summing the scores of the relevant items within that specific domain. Accordingly, the score range for the PAP sub-dimension, which consists of 9 items, was between 9 and 45; for the PIP sub-dimension, which includes 15 items,

between 15 and 75; and for the PDP sub-dimension, which also comprises 9 items, between 9 and 45. In addition to total and subscale scores, a significance score was calculated by dividing the total score by the number of items, providing a mean score on a 5-point scale. This calculation allows for a more standardized interpretation of participants' agreement levels across the entire scale. Higher significance scores reflect greater agreement with safe surgical checklist practices and indicate more favorable perceptions regarding their implementation in clinical settings.

Data Collection

The study commenced with the recruitment of nurses and anaesthesia technicians from hospitals in Istanbul province, all of whom were members of the surgical team. These individuals were initially identified at the Prof. Dr. Cemil Taşçıoğlu Hospital in Istanbul and then reached through the snowball sampling method. The data collection form was distributed online to the participants who had consented to take part in the study voluntarily. Furthermore, the Turkish Association of Surgical and Operating Theatre Nurses assisted in the dissemination of the data collection form to the aforementioned team members.

Statistical Analysis

The findings from the study were evaluated using the SPSS (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, USA) 26 program. The normality of the scores obtained from each continuous variable was analyzed using descriptive, graphical, and statistical methods. The Kolmogorov-Smirnov test was employed to ascertain the normality of the scores obtained from a continuous variable through a statistical methodology. Cronbach alpha reliability coefficients were calculated to assess the scales' reliability. Categorical variables were presented as frequencies (n, %) and continuous variables were presented as means and standard deviations. Comparisons between two groups in continuous variables were conducted using an independent samples t-test. Comparisons between three or more groups were conducted using a one-way ANOVA (analysis of variance) test. Chi-square tests (Pearson's chi-square test and Fisher's exact test) were employed for the comparison of qualitative data. The results were evaluated within a 95% confidence interval, and statistical significance was determined to be $p < 0.05$.

Ethical Considerations

Approval was granted by the Istanbul Atlas University Non-Interventional Scientific Research Ethics Committee on 9 October 2023, with the ethics committee decision bearing the number 08/01. The requisite institutional permission was obtained from the Education Planning Board (EPB) of Istanbul Prof. Dr. Cemil Taşçıoğlu Hospital with the letter dated 5 June 2023 and numbered E-48670771-020-217017077. Subsequently, other participants were recruited through the snowball sampling method, beginning at this initial center. The data were recorded, and the study was conducted following the World Medical Association Declaration of Helsinki and the Personal Data Protection Law (PDPL). All participants provided informed voluntary consent.

Results

It was established that 48.5% of the participants were nurses and 51.5% were anaesthesia technicians. It was observed that 51.2% of the participants were within the age range of 18-25 years, 65% had obtained either a high school diploma or an associate degree, 68.2% had been employed in the surgical unit for five years or less, and 94% were currently engaged in active employment (Table 1).

Table 1. Participant descriptive characteristics (n=334)

Characteristics	n	%
Age (year)		
18-25	171	51.2
26-35	108	32.3
36-45	42	12.6
46 and over	13	3.9
Educational Status		
High school and associate degree	217	65.0
Undergraduate and postgraduate	117	35.0
Surgical unit experience		
1 year and less	120	35.9
2-5 years	108	32.3
More than 5 years	106	31.7
Position in the unit he/she works		
Charge nurse/technician	20	6.0
Staff	314	94.0
Profession		
Nurse	162	48.5
Anaesthesia technician	172	51.5

The Cronbach's alpha reliability coefficient for the total score of the SSC^{TR}-IPQ was found to be α=0.966, while the Cronbach's alpha values for the sub-dimensions of the SSC^{TR}-IPQ ranged between α=0.877 and 0.944. The internal consistency values calculated for the SSC^{TR}-IPQ total score and sub-dimensions indicated that the SSC^{TR}-IPQ was highly reliable. The corrected item-total score correlation coefficients for the 33 items of the SSC^{TR}-IPQ were found to range from r=0.39 to r=0.81. The inter-item correlation matrix for the SSC^{TR}-IPQ revealed a positive and adequate relationship between items (Table 2).

The mean total score obtained by the participants from 33 items of the SSC^{TR}-IPQ was 153.57±16.41. The significance score obtained by dividing the participants' score from the SSC^{TR}-IPQ measurement by the total number of items was 4.65±0.49 out of 5 points. The rate of participants' positive agreement with the SSC^{TR}-IPQ items was approximately 93%. SSC^{TR}-IPQ was hierarchically analyzed in 3 sub-dimensions: Pre-anaesthesia Practices (PAP), Pre-operative Incision Practices (PIP) and Pre-Operative Discharge Practices (PDP). The mean total score and significance level of the participants in the

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subscales of PAP, PIP and PDP were calculated as 42.45±4.44 (significance, 4.72±0.49), 69.49±7.88 (significance, 4.63±0.53) and 41.64±5.22 (significance, 4.63±0.58), respectively. It was observed that the sub-dimension in which the participants had the highest positive agreement was the PAP with a rate of 94%. When the SSC[TR]-IPQ item-based positive agreement rates were analysed, it was found that the statement with the highest rate of agreement (98.8%) was 'The patient's risk assessment should be performed', and the statement with the lowest rate of agreement (74.9%) was 'It should be confirmed that there is no need for prophylactic antibiotic use in untreated patients within 60 minutes before the incision.'. When the SSC[TR]-IPQ items were evaluated as a whole, it was determined that the participants showed a negative agreement of 10% or more for 6 items (items 2, 18, 19, 25, 26 and 27) (Table 2).

Table 2. SSC[TR]-IPQ item statistics (n=334)

	SSC[TR]-IPQ	Positive participation, n(%)	Mean±SD	CITC	α
	PAP-Total Score		**42.45±4.44**		**0.877**
	PAP-Significance Score		**4.72±0.49**		
1	The surgical site marking must be checked.	315(94.3)	4.66±0.85	0.51	
2	If there is no marking in the operation area, it must be ensured that it is not applicable.	262(78.4)	4.22±0.98	0.45	
3	The controls in the anaesthesia safety checklist must be performed.	325(97.3)	4.76±0.68	0.62	
4	It should be checked that the pulse oximeter is working on the patient.	324(97)	4.79±0.65	0.65	
5	Risk assessment of the patient should be done.	330(98.8)	4.81±0.53	0.76	
6	The presence of a known allergy of the patient should be checked.	328(98.2)	4.87±0.58	0.69	
7	It should be checked whether the necessary imaging devices are available.	322(96.4)	4.76±0.66	0.68	
8	The risk of blood loss over 500 ml should be assessed.	322(96.4)	4.74±0.63	0.72	
9	If there is a risk of blood loss over 500 ml in the patient, it should be checked that appropriate vascular access and necessary fluid preparations have been made.	327(97.9)	4.82±0,57	0.79	
	PIP-Total Score		**69.49±7.88**		**0.944**
	PIP-Significance Score		**4.63±0.53**		
10	One member of the team must verify the patient's identity by voice.	313(93.7)	4.68±0.73	0.72	
11	One member of the team must verify the surgery to be performed by voice.	317(94.9)	4.67±0.73	0.78	
12	One member of the team should verify the site of the surgery by voice.	322(96.4)	4.71±0.66	0.78	
13	The estimated duration of surgery should be reviewed in critical events.	306(91.6)	4.49±0.80	0.68	
14	Expected blood loss in critical events should be reviewed.	327(97.9)	4.69±0.62	0.80	
15	Unexpected events that may develop during surgery in critical events should be reviewed.	321(96.1)	4.66±0.64	0.79	

16	Possible anaesthetic risks that may develop during surgery should be reviewed in critical events.	325(97.3)	4.73±0.59	0.76	
17	The position of the patient in critical events should be reviewed.	327(97.9)	4.70±0.61	0.79	
18	Prophylactic antibiotic use within 60 minutes before the incision should be checked.	300(89.8)	4.49±0.81	0.67	
19	It should be confirmed that there is no need for prophylactic antibiotic use in untreated patients within 60 minutes before the incision.	250(74.9)	4.08±1.07	0.39	
20	It should be checked that the materials to be used are ready.	329(98.5)	4.82±0.54	0.79	
21	Sterilisation of the materials to be used must be checked.	328(98.2)	4.83±0.55	0.79	
22	The need for monitoring of blood sugar should be checked and decided.	312(93.4)	4.55±0.74	0.69	
23	Anticoagulant use should be checked.	326(97.6)	4.73±0.62	0.80	
24	The need for deep vein thrombosis prophylaxis should be checked and decided.	320(95.8)	4.66±0.66	0.78	
	PDP-Total Score		**41.64±5.22**		**0.906**
	PDP-Significance Score		**4.63±0.58**		
25	The patient must verbally verify the surgery performed.	264(79)	4.30±1.07	0.59	
26	Verbally verify the operation for the surgery performed.	272(81.4)	4.35±1.01	0.61	
27	Verbally verify the surgical site for the surgery performed.	271(81.1)	4.31±1.06	0.59	
28	Instrument/spanner/compress and needle counts must be made.	328(98.2)	4.84±0.53	0.75	
29	It must be checked that the identity information is written correctly on the sample taken from the patient.	327(97.9)	4.83±0.56	0.79	
30	It should be checked that the region where the patient was taken is correctly written on the sample taken from the patient.	326(97.6)	4.81±0.58	0.79	
31	Recommendations of the anaesthesiologist regarding the critical needs of the patient after surgery should be reviewed.	327(97.9)	4.75±0.59	0.78	
32	The surgeon's recommendations regarding the critical needs of the postoperative patient should be reviewed.	328(98.2)	4.73±0.58	0.81	
33	The unit to which the patient will be sent after the operation must be verified.	324(97)	4.71±0.66	0.74	
	SSC[TR]-IPQ -Total Score		**153.57±16.41**		**0.966**
	SSC[TR]-IPQ -Significance Score		**4.65±0.49**		

SSC[TR]-IPQ: Safe Surgery ChecklistTR Practice Perception Questionnaire; PAP: Pre-Anesthesia Practices; PIP: Pre-operative Incision Practices; PDP: Pre-operative Discharge Practices; CITC: Corrected item-total correlation; α: Cronbach's alpha; SD: Standart Deviation

When examining the variables associated with a rate of disagreement of 10% or more among participants, the rate of disagreement was statistically significantly higher among participants with a high school education and an associate degree to the statement 'The patient should be verbally confirmed for the surgery performed' (χ^2=8.790; p=0.003). While all participants working in the responsible nurse/technician position positively agreed with the statement 'If there is no marking in the operating area, it should be ensured that it is not applicable', 22.9% of the active participants negatively agreed with the statement (p=0.010). Compared to nurses, anaesthesia technicians had a statistically significantly higher rate of disagreement with the statements 'The patient should be verbally informed about the operation performed' and 'The operation should be verbally informed about the operation performed' (item 25, χ^2=8.679; p=0.003 and item 26, χ^2=8.044; p=0.005) (Table 3).

Table 3. Distribution of the statements that the participants disagreed or were undecided at a rate of 10% and above according to their descriptive characteristics (n=334)

Characteristics	n	Item-2 (-)/N	Item-18 (-)/N	Item-19 (-)/N	Item-25 (-)/N	Item-26 (-)/N	Item-27 (-)/N
Total	334	72(21.6)	34(10.2)	84(25.1)	70(21)	62(18.6)	63(18.9)
Age range, n(%)							
18-25	171	44(25.7)	15(8.8)	43(25.1)	37(21.6)	31(18.1)	33(19.3)
26-35	108	21(19.4)	15(13.9)	25(23.1)	22(20.4)	21(19.4)	20(18.5)
36-45	42	7(16.7)	3(7.1)	11(26.2)	9(21.4)	8(19)	8(19)
46 and over	13	0(0)	1(7.7)	5(38.5)	2(15.4)	2(15.4)	2(15.4)
Test value		6.213[a]	2.507[a]	1.478[a]	0.320[a]	0.170[a]	0.133[a]
P-value		0.102	0.474	0.687	0.956	0.982	0.988
Educational Status, n(%)							
High school and associate degree	217	51(23.5)	25(11.5)	54(24.9)	56(25.8)	45(20.7)	46(21.2)
Undergraduate and postgraduate	117	21(17.9)	9(7.7)	30(25.6)	14(12)	17(14.5)	17(14.5)
Test value		1,386[a]	1.219[a]	0.023	8.790[a]	1.938[a]	2.209[a]
P-value		0.239	0.270	0.879	**0.003***	0.164	0.137
Surgical unit experience, n(%)							
1 year and less	120	31(25.8)	9(7.5)	30(25)	30(25)	24(20)	26(21.7)
2-5 years	108	22(20.4)	13(12)	29(26.9)	20(18.5)	18(16.7)	17(15.7)
More than 5 years	106	19(17.9)	12(11.3)	25(23.6)	20(18.9)	20(18.9)	20(18.9)
Test value		2.215[a]	1.501[a]	0.306[a]	1.851[a]	0.427[a]	1.304[a]
P-value		0.330	0.472	0.858	0.396	0.808	0.521
Position in the unit he/she works, n(%)							
Charge nurse/technician	20	0(0)	0(0)	3(15)	3(15)	3(15)	3(15)
Staff	314	72(22.9)	34(10.8)	81(25.8)	67(21.3)	59(18.8)	60(19.1)
Test value		_b	_b	_b	_b	_b	_b
P-value		**0.010***	0.243	0.425	0.777	0.999	0.999
Profession, n(%)							
Nurse	162	34(21)	14(8.6)	41(25.3)	23(14.2)	20(12.3)	27(16.7)
Anaesthesia technician	172	38(22.1)	20(11.6)	43(25)	47(27.3)	42(24.4)	36(20.9)
Test value		0.060[a]	0.813[a]	0.004[a]	8.679[a]	8.044[a]	0.991[a]
P-value		0.806	0.367	0.948	**0.003***	**0.005***	0.320

*p<0.05, a: Pearson chi-squared test, b: Fisher's exact chi-squared test, N: Neutral, (-): Negative participation

When the total and subscale scores of the SSC[TR]-IPQ were analysed according to the descriptive characteristics of the participants, it was found that there was a statistical difference only in the occupation variable. It was found that anaesthesia technicians had statistically significantly lower mean scores on the SSC[TR]-IPQ total (t=2,419; p=0.016), PAP (t=2,027; p=0.047) and PDP (t=3,206; p=0.002) sub-dimensions compared to nurses (Table 4).

Table 4. Mean scores of SSC[TR]-IPQ participation level according to the descriptive characteristics of the participants (n=334)

		SSC[TR]-IPQ			
		PAP	**PIP**	**PDP**	**Total**
Characteristics	**n**	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**
Age (year) n(%)					
18-25	171	4.67±0.55	4.63±0.57	4.62±0.63	4.64±0.55
26-35	108	4.78±0.28	4.67±0.37	4.65±0.44	4.70±0.32
36-45	42	4.65±0.68	4.52±0.68	4.55±0.73	4.56±0.67
46 and over	13	4.93±0.07	4.72±0.36	4.74±0.44	4.78±0.24
Test value		2.124[b]	0.962[b]	0.510[b]	1.065[b]
***P*-value**		0.097	0.411	0.676	0.364
Educational Status, n(%)					
High school and associate degree	217	4.69±0.52	4.62±0.55	4.59±0.61	4.63±0.52
Undergraduate and postgraduate	117	4.76±0.44	4.65±0.48	4.70±0.51	4.70±0.45
Test value		1.306[a]	0.536[a]	1.637[a]	1.131[a]
***P*-value**		0.192	0.592	0.103	0.259
Surgical unit experience, n(%)					
1 year and less	120	4.64±0.63	4.59±0.67	4.56±0.72	4.59±0.65
2-5 years	108	4.76±0.28	4.69±0.33	4.69±0.39	4.71±0.28
More than 5 years	106	4.76±0.47	4.63±0.51	4.64±0.55	4.67±0.47
Test value		2.402[b]	1.027[b]	1.443[b]	1.565[b]
***P*-value**		0.092	0.359	0.238	0.211
Position in the unit he/she works, n(%)					
Charge nurse/technician	20	4.83±0.32	4.72±0.33	4.67±0.37	4.74±0.29
Staff	314	4.71±0.50	4.63±0.54	4.62±0.59	4.65±0.51
Test value		1.093[a]	0.797[a]	0.319[a]	0.780[a]
***P*-value**		0.275	0.426	0.750	0.436
Profession, n(%)					
Nurse	162	4.77±0.30	4.69±0.37	4.73±0.40	4.72±0.32
Anaesthesia technician	172	4.66±0.62	4.58±0.63	4.53±0.70	4.59±0.61
Test value		**2.027[a]**	1.825[a]	**3.206[a]**	**2.419[a]**
***P*-value**		**0.047***	0.069	**0.002***	**0.16***

SSC[TR]-IPQ: Safe Surgery ChecklistTR Practice Perception Questionnaire; PAP: Pre-Anesthesia Practices; PIP: Pre-operative Incision Practices; PDP: Pre-operative Discharge Practices; *p<0.05; a: Independent sample t-test; b: One-way ANOVA test; SD: Standard Deviation

Discussion

The Safe Surgery Checklist (SSC), as a key component of the 'Safe Surgery Saves Lives' campaign launched by WHO in 2008, is an effective tool that aims to increase patient safety in healthcare, strengthen communication between teams, and improve outcomes by reducing surgical errors[15]. Research reports that many healthcare professionals recognize the benefits of SSC, but levels of engagement vary among team members in practice[16-18]. According to the results of a multinational survey, 70.9% of respondents stated that the checklist contributed to patient safety, but only 50.3% were satisfied with the compliance of other team members[19]. This suggests that there is a greater need for education and communication strategies to promote a culture of safety and co-operation in surgical teams. Bozkurt and Tüzer's study emphasized the importance of the SSC[TR] in terms of effective communication and teamwork and stated that the checklist should be seen as a tool that improves team dynamics beyond formality[20]. It has been reported that there is a lack of confidence in the use of checklists among employees with low levels of education, and that this is due to inadequate training[19,21]. Research findings show that compliance decreases as the level of education decreases and that knowledge and experience deficiencies are common, especially among young, inexperienced healthcare workers. These findings suggest that comprehensive training programs and the promotion of a safety culture are needed to increase the effectiveness of the SSC[TR] and ensure the compliance of teams.

The study revealed that participants exhibited a mean score for SSC[TR]-IPQ that was in line with the items, and demonstrated a high level of agreement with the sub-dimensions of the PAP. This high level of positive agreement suggests that surgical team members hold a favourable perception of the SSC[TR]. This finding is consistent with the results of previous studies which have demonstrated that surgical safety checklists can enhance communication within surgical teams and raise healthcare professionals' awareness of patient safety culture[15,20]. The high compliance rate observed in the Pre-Anesthesia Practices subscale serves to underscore the critical importance of this stage in ensuring patient safety. As reported by Liu and Mehigan[15] the highest compliance rates were observed in the verification of patient identity, surgical site safety, and anaesthesia safety. The findings indicate that surgical teams hold a favourable view of the SSC[TR] and patient safety. The high mean score on the SSC[TR] Implementation Perception Questionnaire indicates a high level of adherence among participants about communication, teamwork, and safety protocols.

The high positive compliance rate of 93% for the SSC[TR] items in the study demonstrates that surgical team members recognise the importance of the checklist in improving patient outcomes. This high level of compliance is noteworthy, particularly in light of the inherent challenges associated with implementing safety protocols in operating theatres, where circumstances requiring prompt decision-making are often encountered[20]. The findings of the study lend support to the positive perceptions held by team members of the SSC[TR] and their confidence in their ability to enhance patient safety. The high mean scores and emphasis on preoperative practices suggest the potential benefits of standardising surgical safety checklists. Nevertheless, further research is required to optimise the long-term effects and intra-team use of the SSC[TR].

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The highest positive agreement rate was observed in the statement "Patient risk assessment should be performed," which indicates that surgical teams prioritize patient safety and embrace the importance of preoperative assessments, as emphasized in the literature[15]. The lowest compliance rate was observed for the statement 'It should be confirmed that prophylactic antibiotic use is not required within 60 minutes before the incision'. This may indicate possible deficiencies in the routine practices of the clinic, or it may reflect a confidence that the practice is already fully fulfilled. In either case, non-compliance with this item may be attributed to a lack of awareness or training. The timely administration of prophylactic antibiotics is crucial in preventing surgical site infections. However, there have been reports in the literature indicating inconsistent compliance with these guidelines[22,23].

The study revealed that negative agreement rates of 10% or more were particularly prevalent in items 2, 18, 19, 25, 26 and 27. These items pertain to side marking, prophylactic antibiotic administration, and verification of the patient/operation and the surgical site. This indicates a dearth of knowledge among team members regarding the significance of these practices. Moreover, unfavourable agreement rates on these items present a significant risk to the safety of surgical procedures and patients.

It was observed that negative participation rates differed according to the level of education, age group and professional experience of the participants. The observation that individuals with a high school or associate degree have a higher incidence of non-compliance with surgical verification processes highlights the significance of educational background and professional experience in the effective utilisation of surgical safety checklists. Prior research has also underscored the influence of educational attainment on healthcare professionals' adherence to safety protocols[15,20]. High negative participation rates reflect the difficulties experienced in the effective implementation of the checklist and suggest that a lack of understanding of the importance of verification processes, particularly among employees with lower levels of education, may contribute to high negative participation rates[24]. The results of the study is consistent with those reported in the existing literature. The aforementioned findings indicate that healthcare institutions experience deficiencies in leadership with regard to the development of a patient safety culture and the enhancement of the qualifications of healthcare professionals through continuing education programs.

Study Limitations

One of the limitations of this study is that the findings may not be generalizable to the broader surgical team in Istanbul, as the data were collected from a limited sample. The study was conducted exclusively with nurses and anesthesia technicians, which may restrict the diversity of perspectives within the surgical team.

Conclusion

While the safe surgery checklist is an invaluable tool for enhancing surgical safety, its efficacy hinges on the comprehensive involvement and adherence of all team members. It is recommended that continuing education programs that promote a culture of patient safety be developed and implemented to increase compliance, particularly among healthcare professionals with low levels of education. A robust educational process,

efficacious communication strategies, and a supportive team environment can enhance patient safety in surgical settings by fostering compliance with safety protocols. It is recommended that future research focus on the development of interventions that address the identified barriers to compliance with the Safe Surgery Checklist^{TR.}

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Conflict of Interest

The authors declare that they have no conflicts of interest.

Author Contributions

NA: Conceptualization, Methodology, Writing – Original Draft, Writing - Review & Editing, Supervision.

HBK: Methodology, Writing–Original Draft, Writing-Review & Editing, Supervision.

SG: Methodology, Writing-Review & Editing, Supervision.

FH: Methodology.

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Relationship between Parental Attitudes and Anger Expression Styles in Children and Adolescents[*]

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Abstract

Aim: In this study, it is aimed to examine the relationship between parental attitudes, anger and anger expression styles.

Method: The research was conducted using a survey method. The sample consisted of 412 participants aged between 8 and 18 years, including both children and adolescents from Diyarbakır. In order to collect data, a socio-demographic data form prepared by the researcher, the Trait Anger and Anger Expression Scale, and the Parental Attitude Scale were administered on participants. Descriptive analyses, T-tests, ANOVA, and correlation analyses were employed to analyze the research data.

Results: Of the children and adolescents participating in the study, 41.7% were between the ages of 11 and 15. The study found a positive correlation between the trait anger subscale and permissive (r: 0.191; p<0.05), protective (r: 0.145; p<0.05), democratic (r: 0.102; p<0.05) and authoritarian parental attitudes (r: 0.341; p<0.05). Additionally, a moderate, positive relationship was found between the controlled anger subscale and protective (r: 0.333; p<0.05) and democratic parental attitudes (r: 0.537; p<0.05). There was also a positive relationship between the outwardly expressed anger subscale and permissive (r: 0.219; p<0.05), protective (r: 0.145; p<0.05), democratic attitudes (r: 0.140; p<0.05) and authoritarian attitudes (r: 0.348; p<0.05). Finally, positive correlation was found between the suppressed anger subscale and permissive (r: 0.218; p<0.05), protective (r: 0.157; p<0.05), democratic (r: 0.263; p<0.05), and authoritarian (r: 0.138; p<0.05) parental attitudes.

Conclusion: The study concluded that there is a significant relationship between trait anger, controlled anger, suppressed anger, and outwardly expressed anger levels and parental attitudes. In this context, this study suggests that parents should be aware of their parenting styles because these styles impact chidren's anger and its expression.

Keywords: Children, adolescent, anger, anger expression, parental attitudes.

Çocuk ve Ergenlerde Öfke İfade Tarzları ile Ebeveyn Tutumları Arasındaki İlişki

Öz

Amaç: Bu çalışmada, ebeveyn tutumları ile öfke ve öfke ifade tarzları arasındaki ilişkinin incelenmesi amaçlanmıştır.

Yöntem: Araştırma, anket yöntemi kullanılarak gerçekleştirilmiştir. Örneklem, Diyarbakır ilindeki 8-18 yaş aralığındaki çocuk ve ergenlerden oluşan 412 katılımcıdan meydana gelmektedir. Verilerin toplanması için katılımcılara araştırmacı tarafından hazırlanan sosyo-demografik veri formu, Sürekli Öfke ve Öfke İfade

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ETHICAL STATEMENT: This study was approved by the Istanbul Gelisim University Ethics Committee Presidency with the decision dated 08/05/2020 and numbered 2020-28-29 to conduct the research

Tarzı Ölçeği ve Ebeveyn Tutumları Ölçeği uygulanmıştır. Araştırma verilerinin analizinde tanımlayıcı analizler, T-testleri, ANOVA ve korelasyon analizleri kullanılmıştır.

Bulgular: Çalışmaya katılan çocuk ve ergenlerin %41,7'si 11-15 yaş aralığındadır. Araştırmada, sürekli öfke alt ölçeği ile hoşgörülü (r:0,191; p<0,05), koruyucu (r:0,145; p<0,05), demokratik (r:0,102; p<0,05) ve otoriter ebeveyn tutumları (r:0,341; p<0,05) arasında pozitif yönde bir ilişki bulunmuştur. Ayrıca, kontrollü öfke alt ölçeği ile koruyucu (r:0,333; p<0,05) ve demokratik ebeveyn tutumları (r:0,537; p<0,05) arasında orta düzeyde pozitif bir ilişki bulunmuştur. Dışa vurulan öfke alt ölçeği ile hoşgörülü (r: 0,219; p<0,05), koruyucu (r:0,145; p<0,05), demokratik (r:0,140; p<0,05) ve otoriter ebeveyn tutumları (r:0,348; p<0,05) arasında pozitif bir ilişki bulunmuştur. Bastırılan öfke alt ölçeği ile hoşgörülü (r:0,218; p<0,05), koruyucu (r:0,157; p<0,05), demokratik (r:0,263; p<0,05) ve otoriter (r:0,138; p<0,05) ebeveyn tutumları arasında pozitif bir korelasyon bulunmuştur.

Sonuç: Bu çalışma, sürekli öfke, kontrollü öfke, bastırılan öfke ve dışa vurulan öfke düzeyleri ile ebeveyn tutumları arasında anlamlı bir ilişki olduğunu ortaya koymuştur. Bu çalışma çocuklarının öfke ve öfke ifade tarzlarını etkiledikleri için ebeveynlerin ebeveynlik stillerinin farkında olmaları gerektiğini vurgulamaktadır.

Anahtar Sözcükler: Çocuk, ergen, öfke, öfke ifadesi, ebeveyn tutumları.

Introduction

Anger is an intense emotion experienced in situations of threat, restriction, attack, or frustration, often accompanied by aggressive behaviors directed towards the situation or individual causing it[1]. Anger can range from a mild sense of discomfort to extreme hatred and violence, encompassing mental, physical, and emotional factors. Based on its duration, anger is categorized into state anger and trait anger. State anger refers to the tension and irritability experienced when a person's goals are obstructed or when they face an injustice. Trait anger, on the other hand, is characterized by a persistent and increasing level of anger in response to life events. Anger can be expressed in various ways. While sometimes visible through the physical reactions of the body, in other cases, it may be overly suppressed and show no clear signs. Similar to the emotion itself, anger behaviors are learned, and these behaviors can be transformed into constructive, healthy, and positive actions[2].

Parents play a pivotal role for healthy psychological growth of children[3]. Individuals who grow up in a nurturing environment where they receive love and respect during childhood are better able to develop themselves. According to Baumrind (1967), four different types of parenting are described, these parenting attitudes include authoritarian, authoritative, permissive and uninvolved parenting styles[4]. Democratic parenting is characterized by respecting the child's existence and desires, assigning responsibilities according to developmental stages, and granting the child the right to speak and make choices. Authoritarian parenting, on the other hand, involves parents not accepting their children as they are and managing them according to their desires, often resorting to excessive punishment when the child resists. In permissive parenting, parents exhibit excessive tolerance toward their children. Uninvolved parenting involves a lack of interest in the child's physical and emotional needs, insufficient affection and compassion, and indifference to discipline and control. In such families, parents do not provide guidance, supervision, or discipline, leaving the children to manage on their own without imposing any restrictions on their behavior.

Research papers, particularly focusing on university students, have shown that democratic parenting contributes positively to self-actualization in individuals. In

contrast, authoritarian parenting, marked by strict discipline and conditional love, as well as overly protective or neglectful parenting styles, have been found to hinder the development of key personality traits such as self-confidence and independence. Overly protective, rejecting, restrictive, punitive, and inconsistent parenting styles also negatively affect personality development. Individuals who are uncomfortable with this situation experience anger, which they may either suppress or express destructively in inappropriate situations and places[5-6]. Anger outbursts and aggressive behaviors within the family negatively impact all family members, with children being more vulnerable to these effects[7]. Authoritarian parenting style involves low levels of healthy environments for children, which leads to aggressive behaviors. Unfortunately, children who are physically punished do not fully develop internal control, leading to feelings of resentment, hatred, and anger towards their parents and others in their environment[8-9]. Kağıtçıbaşı and Cemalcılar (2014) emphasize the importance of presenting non-aggressive role models to children during their socialization period, stating that only in this way can future aggressive behaviors be prevented[10]. Bulut (2018) examined the relationship between anger expression styles and parental attitudes between high school students and concluded that parental attitudes influence adolescents' continuous anger. Continuous anger was found to increase proportionally with protective parental attitudes, though the relationship was weak. A negative significant relationship was found between continuous anger scores and democratic parental attitudes, while a positive relationship was observed between continuous anger and authoritarian parenting attitudes. A positive correlation was also found between controlled anger and democratic parental attitudes, as well as between outwardly expressed anger and authoritarian parental attitudes. However, no significant relationship was found between inwardly held anger and protective, democratic, or authoritarian parental attitudes[11]. In Say's (2016) study, the quality of relationships between parents and adolescents, problem-solving, and anger levels were investigated, and it was found that specific parental attitudes were related to continuous anger in adolescents[12]. Sağır (2016), investigated the effect of parental attitudes on anger expression styles in adolescents. The study concluded that there is a significant relationship between anger expression styles and continuous anger levels in adolescents and parental attitudes. Moreover, it was found that as democratic parental attitudes increased, adolescents' continuous anger, inwardly held anger, and outwardly expressed anger decreased, and anger control improved. Conversely, as authoritarian and protective/demanding parental attitudes increased, adolescents' continuous anger, inwardly held anger, and outwardly expressed anger increased, while anger control decreased[13]. Another study examined the relationship between adolescents' anger towards school and perceived parental attitudes in their study. It was found that students who perceived their parents as democratic or permissive/tolerant displayed more acceptable behaviors in expressing their anger compared to those who perceived their parents as permissive/neglectful or authoritarian[14]. With all these results, it is possible to mention that there is a gap about studies on this particular topic in developing countries. So, it is important for us to conduct this study in order to examine the relationship between parenting styles, anger, and its expression in children and adolescents in Diyarbakır. The main hypothesis to be

tested in this research is that there is a significant correlation between parenting styles, anger levels, and anger expression in children and adolescents.

Material and Methods

This study is a descriptive and a cross-sectional study. 412 children and adolescents aged 8-18 years living in Diyarbakır constituted the sample. Data were collected through an online questionnaire created via Google Drive. To collect data, sociodemographic data form which was prepared by the researchers, Trait Anger and Anger Expression Scale and Parental Attitude Scale were used. Trait Anger (T-Anger) and Anger Expression Scale (Anger-Ex) was developed by Spielberger[15]. Its validity and reliability were established by Özer[16]. Parental Attitude Scale measures parenting patterns. The scale, validated and made reliable by Demir and Şendil, consists of 46 questions and four sub-dimensions. The scale assesses the following sub-dimensions: democratic, authoritarian, protective, and permissive attitudes[17].

Data Analyses

The data were analyzed using the SPSS 22.0 statistical software package. Descriptive statistical methods were used to evaluate the data. A normality distribution analysis was performed to determine the appropriate statistical tests. The Skewness-Kurtosis test statistics for the scale data ranged between -1.5 and +1.5, indicating a normal distribution, thus allowing for the application of parametric tests. For comparisons of quantitative data, the independent samples t-test was used for comparisons between two groups. For comparisons involving more than two groups, the One-Way ANOVA test was used, followed by Tukey's test to identify the group causing the difference. The results were evaluated at a 95% confidence interval, with a significance level of $p < 0.05$.

This study was approved by the Istanbul Gelisim University Ethics Committee Presidency with the decision dated 08/05/2020 and numbered 2020-28-29 to conduct the research. The participants in this study were informed before the survey and a consent form was signed.

Results

Demographic characteristics of the participants are present in Table 1.

Table 1. Demographic characteristics of participants

Demographic characteristics	Frequency (n)	Percentage (%)
Sex		
Female	214	52.0
Male	198	48.0
Age Range		
8-10	99	24.0
11-15	172	41.7
16-18	141	34.2
Parental Relationship Status		
Both Alive and Married	367	89.1
Mother Deceased	19	4.6
Father Deceased	19	4.6
Both Alive and Divorced	7	1.7

The analysis of differences in Trait Anger and Anger Expression Scale and Parental Attitudes scores by gender among the participants in the study was conducted using an Independent Samples T-Test (Table 2). The analysis revealed that there were no significant differences between genders ($p > 0.05$).

Table 2. Independent T-Test Analysis of Differences in Trait Anger and Anger Expression Style Scale (TAAE) and Parental Attitudes Scores by Gender

	Gender	**n**	**Mean**	**t**	**p**
Trait Anger	Female	216	2.6384	0.784	0.433
	Male	196	2.5745		
Controlled Anger	Female	216	3.5064	0.679	0.498
	Male	196	3.4471		
Outwardly Expressed Anger	Female	216	2.5029	0.290	0.772
	Male	196	2.4815		
Inwardly Held Anger	Female	216	2.5723	1.255	0.210
	Male	196	2.4777		
Permissive Style	Female	216	2.0654	-0.430	0.668
	Male	196	2.0925		
Protective Style	Female	216	3.5540	-0.240	0.810
	Male	196	3.5731		
Authoritarian Style	Female	216	2.0328	-1.182	0.238
	Male	196	2.1081		
Democratic Style	Female	216	4.0779	-0.313	0.754
	Male	196	4.1050		

The analysis of differences in Trait Anger and Anger Expression Style Scale (TAAE) scores by age among the participants was conducted using One-Way ANOVA. The analysis revealed that there were significant differences in anger expression scores based on age ($p < 0.05$) . Post-hoc (Tukey) analysis identified that individuals aged 16-18 had higher levels of trait anger, outward anger, and internalized anger compared to those 8-10 years old. The analysis of differences in parenting attitudes by age among the participants was conducted using One-Way ANOVA. The analysis revealed that there were significant differences in the permissive parenting attitude levels based on age ($p < 0.05$) . Post-hoc (Tukey) analysis showed that parents of children aged 16-18 exhibited higher levels of permissive attitudes compared to parents of children aged 11-15 (Table 3).

Table 3. One-Way ANOVA Analysis of Differences in Trait Anger and Anger Expression Style Scale and Parental Attitude Scores by Age Among Participants

	Age	n	Mean	SD	F	p
Trait Anger	8-10*	99	2.4596	.79088	4.531	**0.011**
	11-15	172	2.5628	.85813		
	16 18**	141	2.7674	.79602		
	Total	412	2.6080	.82839		
Controlled Anger	8-10	99	3.4987	1.01086	1.146	0.319
	11-15	172	3.4041	.88506		
	16 18	141	3.5541	.78764		
	Total	412	3.4782	.88615		
Outwardly Expressed Anger	8-10*	99	2.3535	.74446	4.401	**0.013**
	11-15	172	2.4586	.74463		
	16 18**	141	2.6321	.73963		
	Total	412	2.4927	.74900		
Inwardly Held Anger	8-10*	99	2.2816	.67014	9.168	**0.000**
	11-15**	172	2.5233	.79346		
	16 18**	141	2.7048	.75980		
	Total	412	2.5273	.76878		
Permissive Style	8-10	99	2.0657	.68497	6.781	**0.001**
	11-15*	172	1.9644	.55104		
	16 18**	141	2.2261	.66931		
	Total	412	2.0783	.63542		
Protective Style	8-10	99	3.6487	.78691	0.780	0.459
	11-15	172	3.5484	.81907		
	16 18	141	3.5209	.80323		
	Total	412	3.5631	.80561		
Authoritarian Style	8-10	99	2.0101	.68066	2.547	0.080
	11-15	172	2.0211	.58861		
	16 18	141	2.1676	.67989		
	Total	412	2.0686	.64592		
Democratic Style	8-10	99	4.1925	.89360	1.532	0.217
	11-15	172	4.1105	.88203		
	16 18	141	3.9954	.86846		
	Total	412	4.0908	.88135		

SD: Standard Deviation

The analysis of differences in Trait Anger and Anger Expression Style Scale and parental attitudes scores by parental marital status among the participants was conducted using One-Way ANOVA. The analysis revealed that there were no significant differences in

anger expression scores and parental attitude scores based on parental marital status (p > 0.05).

The relationship between the scores of Trait Anger and Anger Expression Style Scale and parental attitudes scales was examined using correlation analysis. There was a low-level positive correlation between trait anger subscale and permissive attitudes (r:0.191; p<0.05), protective attitudes (r:0.145; p<0.05), and democratic attitudes (r:0.102; p<0.05) and moderate-level positive correlation between trait anger subscale and authoritarian attitudes (r:0.341; p<0.05). There was a moderate level positive correlation between controlled anger subscale and protective attitudes (r:0.333; p<0.05) and democratic attitudes (r:0.537; p<0.05). There was a low level positive correlation between outwardly expressed anger subscale and permissive attitudes (r:0.219; p<0.05), protective attitudes (r:0.145; p<0.05), and democratic attitudes (r:0.140; p<0.05), and a moderate level positive correlation with authoritarian attitudes (r:0.348; p<0.05). There was a low level positive correlation between internalized anger subscale and permissive attitudes (r:0.218; p<0.05), protective attitudes (r:0.157; p<0.05), democratic attitudes (r:0.263; p<0.05), and authoritarian attitudes (r:0.138; p<0.05). Based on these results, it can be said that participants' parents' authoritarian attitudes have a moderate-level correlational effect on the levels of trait anger and outwardly expressed anger. Additionally, participants' parents' protective and democratic attitudes are moderately correlated with the levels of controlled anger.

Table 4. Analysis of Relationship Between Trait Anger and Anger Expression Style Scale and Parental Attitude Scores

		Trait Anger	Controlled anger	Outwordly Expressed Anger	Inwardly Held Anger	Permissive Style	Protective Style	Athoritarian style	Democratic style
Trait Anger	r	1							
	p.								
Controlled anger	r	-,198**	1						
	p.	,000							
Outwordly Expressed Anger	r	,713**	-,070	1					
	p.	,000	,156						
Inwardly Held Anger	r	,505**	,138**	,521**	1				
	p.	,000	,005	,000					
Permissive Style	r	,191**	,026	,219**	,218**	1			
	p.	,000	,599	,000	,000				
Protective Style	r	,145**	,333**	,145**	,157**	,149**	1		
	p.	,003	,000	,003	,001	,002			
Authoritarian Style	r	,341**	-,122*	,348**	,263**	,386**	,113*	1	
	p.	,000	,013	,000	,000	,000	,022		
Democratic Style	r	,102*	,537**	,140**	,168**	-,016	,655**	-,079	1
	p.	,039	,000	,005	,001	,752	,000	,111	

Discussion

In this study, the analysis of Trait Anger and Anger Expression Scale scores by gender revealed no significant differences in anger and anger expression styles (p>0.05). According to Manap and Kış, there was no significant difference in anger scores among males and females. In their sample, 3495 participants (47.05%) were male and 52.95%

were female. The results indicate that anger levels do not vary based on gender[18]. However, other studies in the literature have shown differing results. Özmen, Özmen, Dündar, Çetinkaya, and Taşkın found that the most influential factors on adolescents' trait anger levels and anger styles were anxiety, gender, and family type. Male students were found to have higher levels of trait anger and expressed their anger more, while female students controlled their anger more[19]. Keskin, Gümüş and Engin also reported that anger expression styles differ by gender, with variations in anger provocation, levels, and expression modes between males and females. The impact of gender on anger expression is noted as women often direct their anger inwardly, manifesting as depression and self-harm, whereas men express their anger directly[20]. The differing results in our study may be related to methodological differences and sample variations compared to other studies. In our study, it was observed that there were no differences in parenting attitudes based on the participants' gender. Çeçen and Arcan found no significant differences in parenting styles between male and female high school students[21-22].

In our study, it is found that trait anger, outwardly expressed anger, and internalized anger varied by age, with those aged 16-18 showing higher levels compared to younger participants. Erdoğan similarly found that trait anger and anger expression styles varied by age, with 16-year-olds exhibiting higher levels compared to younger participants[23]. Adolescence is a time of profound change, involving physical, cognitive, emotional, and social development. These changes create major challenges for managing anger.

The analysis of Trait Anger and Anger Expression Scale scores by parental relationship status revealed no significant differences. Researchs found higher levels of trait anger, expressed anger, and suppressed anger among adolescents from fragmented families, with less ability to control their anger[19,24]. Additionally, Altuntaş identified significant differences in trait anger, anger control, and outwardly expressed anger values based on birth order, with higher levels found in adolescents with divorced parents, whereas no differences were found among those with non-divorced parents[25]. The lack of significant findings in our study may be related to the small number of children with divorced parents in the sample and methodological differences.

In the analysis of the relationship between parenting attitudes and anger expression styles, correlations were found between these variables. A moderate positive and significant relationship was observed between authoritarian attitudes and trait anger. A moderate positive and significant relationship was observed between controlled anger and protective and democratic attitudes. A moderate positive and significant relationship was also found between authoritarian attitudes and outwardly expressed anger. This suggests that children with authoritarian parents tend to have higher levels of trait anger and are more likely to express their anger outwardly. Conversely, protective and democratic parenting attitudes were moderately correlated with controlled anger, indicating their importance in managing anger among children and adolescents. Bulut examined anger expression styles and parenting attitudes among high school students, finding that parenting attitudes impact trait anger. Bulut's study found a direct correlation between trait anger and protective attitudes, a negative and significant correlation between trait anger and democratic attitudes, and a positive and significant

correlation between trait anger and authoritarian attitudes. Controlled anger showed a positive correlation with democratic attitudes, while outwardly expressed anger had a negative correlation with democratic attitudes and a positive correlation with authoritarian attitudes[11]. In democratic parenting, parents show flexibility in their approach and therefore have low level of psychological control and it is helpful in minimizing negative and agressive behavior in children. On the other hand, authoritarian parents shows more psychological control to influence their will on children. This can leave children conflicted, less communicative, and less trustful. That is why the authoritarian parenting style has more negative effects on children's aggressive behavior compared to authoritative and permissive parenting. If the parents have an authoritarian attitudes, children show more aggressive behavior than other types of parenting style[26-29]. Authoritarian discipline, which is characterized by high pressure on children and expressed aggression and rejection, generates anger, resentment, and rebellion in children. These feelings predict social rejection that further amplifies the anger[30]. Montemayor found that children with indifferent or inconsistent parenting exhibited higher tendencies towards aggressive behaviors[31]. Sağır also found significant differences in anger expression styles and trait anger levels based on parenting attitudes, with increased democratic attitudes associated with reduced anger and better anger control[13]. Students perceiving their parents as democratic or permissive exhibited more acceptable anger behaviors compared to those perceiving their parents as permissive/neglectful or authoritarian[14].

Conclusion

The findings suggest that parental attitudes play a crucial role in shaping how children manage and express their anger. The study underscores the importance of understanding the impact of different parenting styles on children's anger expression. It is highly recommended that authorities should provide educational sessions to parents and parents should participate them so that they can handle their children's emotions. Parents are encouraged to adopt supportive and constructive attitudes to positively influence their children's anger management. Trainings about parenting will help parents to learn different ways for developing a healthy home environment for their children. Although this study has some limitations, such as its cross-sectional design, reliance on scale-based measures, being conducted in a specific region that may limit the generalizability of the findings to other areas with different demographics, and being conducted online, the study has valuable contributions to understanding the relationship between parenting styles and anger of children in Diyarbakır, Turkey. These results highlight the benefits of parenting as a highly important support for managing anger for children.

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Evaluation of Eating Behaviors in Adults with a Three-Factor Eating Scale According to Gender, Body Mass Index and Physical Activity Status: A Cross-Sectional Study

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Abstract

Aim: Eating behavior affects the development of obesity and related health problems and is related to individual and environmental factors. The aim of the study is to investigate the relationship between eating behaviors and characteristics such as gender, BMI, and frequency of physical activity.

Method: 436 participants aged 18-65 living in Istanbul were included in the study. Participants filled out a survey form containing questions about sociodemographic characteristics and eating habits and the Three-Factor Eating Scale (TFEQ-R18) online. The data were analyzed with IBM SPSS 26 Statistical Package Program, and the significance level was accepted as $p<0.05$.

Results: Female participants' cognitive restraint ($p<0.05$) and emotional eating ($p<0.001$) factor scores were found to be significantly higher than male participants. According to BMI classes, the cognitive restraint score of underweight participants was lower than all other groups, and the score of obese participants was lower than overweight participants ($p<0.05$). Obese participants had higher uncontrolled eating scores than normal and slightly obese participants, and hunger sensitivity scores were higher than normal weight participants ($p<0.05$). It was determined that the cognitive restraint score of those who performed physical activity 1-3 or 3-5 times a week was higher than those who did not perform physical activity ($p<0.001$).

Conclusion: Eating behaviors in adults may vary according to gender, BMI class and physical activity status. It is thought that determining these differences will be useful in better understanding eating behaviors and planning interventions for the negative effects of behaviors. It is thought that this study will contribute to understanding how eating behaviors assessed using the TFEQ-R18 vary according to gender, BMI classes and physical activity levels in the Turkish adult population.

Keywords: Feeding behavior, eating behavior, body mass index.

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Yetişkinlerde Yeme Davranışlarının, Cinsiyet, Beden Kütle İndeksi ve Fiziksel Aktivite Durumuna Göre Üç Faktörlü Yeme Ölçeği ile Değerlendirilmesi: Kesitsel Bir Çalışma

Öz

Amaç: Yeme davranışı, obezite ve ilişkili sağlık sorunlarının gelişimi üzerine etkili olup bireysel ve çevresel faktörlerle ilişkilidir. Çalışmanın amacı yeme davranışlarının cinsiyet, BKİ ve fiziksel aktivite sıklığı gibi özelliklerle ilişkisini araştırmaktır.

Yöntem: Çalışmaya İstanbul'da yaşayan 18-65 yaş arası 436 katılımcı alınmıştır. Katılımcılar, sosyodemografik özellikleri ve beslenme alışkanlıklarına dair sorular içeren bir anket formu ile Üç Faktörlü Yeme Ölçeğini (TFEQ-R18) çevrimiçi yöntem ile doldurmuştur. Veriler IBM SPSS 26 İstatistik Paket Programı ile analiz edilmiş, anlamlılık düzeyi p<0.05 olarak kabul edilmiştir.

Bulgular: Kadın katılımcıların bilişsel kısıtlama (p<0.05) ve duygusal yeme (p<0.001) faktörü puanı erkeklerden anlamlı olarak daha yüksek bulunmuştur. BKİ sınıflarına göre, zayıf katılımcıların bilişsel kısıtlama puanı, diğer tüm gruplardan daha düşük; obez katılımcıların puanı ise fazla kilolu olanlardan daha düşük saptanmıştır (p<0.05). Obez katılımcıların kontrolsüz yeme puanlarının, normal ve hafif şişman olan katılımcılardan daha yüksek; açlığa duyarlılık puanlarının ise normal ağırlıktaki katılımcılardan daha yüksek olduğu bulunmuştur (p<0.05). Haftada 1-3 veya 3-5 kez fiziksel aktivite yapanların bilişsel kısıtlama puanının aktivite yapmayanlardan daha yüksek olduğu belirlenmiştir (p<0.001).

Sonuç: Yetişkinlerde yeme davranışları cinsiyete, BKİ sınıfına ve fiziksel aktivite durumuna göre değişebilmektedir. Bu farklılıkların belirlenmesinin, yeme davranışlarının daha iyi anlaşılması ve davranışların olumsuz etkilerine yönelik müdahalelerin planlanmasında faydalı olacağı düşünülmektedir. Bu çalışmanın, TFEQ-R18 kullanılarak değerlendirilen yeme davranışlarının Türk yetişkin popülasyonunda cinsiyet, BKİ sınıfları ve fiziksel aktivite seviyelerine göre nasıl değiştiğini anlamaya katkıda bulunacağı düşünülmektedir.

Anahtar Sözcükler: Beslenme davranışı, yeme alışkanlığı, beden kütle indeksi.

Introduction

Overweight and obesity are a growing global epidemic affecting millions of people in both developed and developing countries. Worldwide, 2.5 billion adults were overweight in 2022, of whom 890 million were obese, posing a major risk for serious non-communicable diseases associated with nutrition, including diabetes, cardiovascular disease, hypertension, stroke, and certain types of cancer[1].

Understanding the reasons for people's food choices is crucial for the development of interventions to promote healthy eating and prevent the development of obesity[2]. The study of eating behaviors focuses on the etiology of obesity and the promotion of healthy eating patterns to help manage and prevent it. There are numerous individual and environmental determinants of eating behavior. Individual factors that are often emphasized include physiological processes such as hunger and satiety, as well as psychological processes such as personality traits, cognitive processes, and self-regulation[3].

The Three-Factor Eating Questionnaire (TFEQ) is a valid and reliable instrument used to measure eating behavior. Factors included in the questionnaire are cognitive disinhibition, uncontrolled eating, emotional eating, and hunger sensitivity. Cognitive restraint refers to individuals consciously restricting food intake for weight control or loss, while uncontrolled eating refers to the loss of control over excessive food intake. Emotional eating measures inadequacy to emotional symptoms, while the hunger sensitivity factor assesses the difficulty in controlling eating in case of hunger[4].

Previously, it has been determined that eating behaviors are related to various individual characteristics, and it has been reported that behaviors may vary in people with different body mass index (BMI)[5], differences may be found between genders[6] and physical activity levels may affect eating behaviors[7].

A better understanding of eating behaviors in adults and how these behaviors may vary according to factors such as gender, BMI, and frequency of physical activity is thought to be a guide in the prevention of obesity and related diseases. Despite evidence linking eating behaviors to BMI and physical activity, few studies have explored these associations in a Turkish population using the TFEQ-R18. In this study, sociodemographic characteristics such as educational status, income level, some dietary habits, and BMI were also evaluated according to gender in order to have an idea about the factors that may change eating behavior according to gender. In this context, our study aimed to examine the changes in eating behaviors according to gender, BMI and physical activity frequency.

Material and Methods

Participants

The participants of this cross-sectional study were individuals between the ages of 18-65 who reside in Istanbul and agreed to participate in the research. The formula $n=[NZ^2P(1-P)]/[d^2(N-1)+Z^2P(1-P)]$ was used to determine the minimum number of participants to be reached (n: minimum number of people to be included in the sample, N: population size, Z: Z statistic for a confidence level [1.96 for 5% margin of error], P: expected rate, d: standard error of the rate to be determined in the research)[8]. The population between the ages of 15-65 in Istanbul in 2020 is 10012695 people[9], and since the internet access rate of the region in 2020 was 96.4%[10], the study population consisted of 9612187 people. Considering the Turkey Nutrition and Health Survey-2017 data, the prevalence of obesity in individuals aged 15 and over in Istanbul is 30.7%[11]. Taking these numbers into account, the minimum number of participants was calculated as follows:

$$n=[9612187 \times (1.96)^2 \times 0.3 \times 0.7]/[(0.05)^2(9612187-1)+(1.96)^2 \times 0.3 \times 0.7] \approx 323$$

Participants were included using the convenience sampling method. Since the study was a preliminary study aimed at understanding the general trends of the subject, the convenience sampling method was chosen. A total of 436 participants, 273 female and 163 male, were included in the study. After the participants approved the consent form online, the online survey questions were started. Ethics committee approval belongs to Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee with its decision dated 20/05/2021 and numbered 539.

Obtaining Data

Data were collected between February and April 2021 through an online questionnaire consisting of 2 sections. The first section of the survey form included questions about sociodemographic characteristics, general eating habits, body weight, height, presence of chronic diseases, physical activity levels, smoking and alcohol use; the second part included the Revised Three-Factor Eating Scale (TFEQ-R18). Stunkard and Messic first developed the TFEQ in 1985, which was used to evaluate participants' eating behaviors[12], and the scale later shortened and revised[13,14]. The Turkish validity and reliability of the

scale was proven in 2015[4]. The scale consists of a total of 18 questions. The scale, which includes the subheadings of uncontrolled eating, cognitive restraint, emotional eating and sensitivity to hunger, consists of 18 questions in total. Uncontrolled eating, which is among the subheadings of the scale, is measured by questions 1, 7, 13, 14 and 17. Questions measuring other subheadings are distributed as follows; questions 3, 6 and 10 for emotional eating behavior; questions 2, 11, 12, 15, 16 and 18 for cognitive restriction behavior; and questions 4, 5, 8 and 9 measure hunger sensitivity behavior. In the scoring of the questions, the choices for questions 1-13 are from 4 to 1 from top to bottom, and for questions 14-17, the choices are from 1 to 4 from top to bottom. In the last question, items 1 and 2 were scored as 1 point; items 3 and 4 as 2 points; items 5 and 6 as 3 points; and items 7 and 8 as 4 points. A high score on each sub-factor indicates a high level of behavior on that factor.

Body weight and height of the individuals were obtained by self-report. With this information, BMI was calculated and classified according to the World Health Organization criteria[15].

Statistical Analysis of Data

IBM SPSS 26 Statistical Package Program was used for statistical evaluation of the data. Number (n) and percentage (%) values of categorical data are given. The normality of the distribution of the data was tested with the Shapiro-Wilk test. Mann Whitney U test was used to compare the numerical data of two independent groups that did not show normal distribution. Kruskal Wallis test was used when there were more than two groups in this situation. Pearson Chi-square test was used to compare categorical data. Significance level was accepted as $p<0.05$.

Results

A total of 436 individuals between the ages of 18-64, 62.6% of whom were male, participated in the study. The proportion of married men (55.8%) was higher than women (36.3%). 39.0% of the participants were students and the distribution of occupation varied according to gender ($p=0.003$). While the majority of women were students (43.6%), the majority of men were civil servants (36.8%). When pairwise comparisons were made, a significant difference was found between being a civil servant or student ($p=0.001$) and being a civil servant or working in other professions ($p=0.031$). It is seen that the rate of being a civil servant is higher among men (36.8%) than women (22.7%). The majority of the participants (82.3%) have a university degree or higher, and there is no significant difference in educational attainment by gender. Monthly income status differed according to gender ($p<0.001$). As a result of pairwise comparisons, a significant difference was found between those whose income was below 2000 TL and above 5000 TL ($p<0.001$) and between those whose income was between 2000-5000 TL and above 5000 TL ($p=0.001$). The proportion of men with an income above 5000 TL (48.5%) was higher than that of women (26.4%). Having a diagnosed disease and alcohol consumption did not differ significantly between genders ($p>0.05$). The smoking rate of men (42.9%) was significantly higher than that of women (25.6%) ($p<0.001$). The BMI of 52.8% of the participants was in the normal range. The distribution of BMI classes according to gender showed a significant difference ($p<0.001$). The rate of being underweight is higher in women (11.4%) than in men (2.5%), while the rate of overweight

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and obese men (40.5%, 21.5% respectively) is higher than in women (19.0%, 6.6% respectively). Participants' meal skipping status varied according to gender (p=0.025); the rate of meal skipping was higher in women (45.8%) than in men (36.8%). The reason for skipping meals was mostly (55.2%) reported as "I dont want". The rate of skipping meals due to not wanting to eat (61.1%) and other reasons (8.5%) is higher in women than in men (43.8%, 7.4% respectively). In men, the rate of skipping meals due to weight loss (11.6%) and lack of time (37.2%) was found to be higher than in women (8.1%, 22.2% respectively).While 46.6% of the participants consumed meals at a normal pace, 38.1% consumed them quickly. The proportion of fast eaters was higher among men (51.5%) than women (30.0%) (Table 1).

Table 1. Some sociodemographic characteristics, BMI classes and nutritional habits of participants by gender

Features		Gender				Total		χ^2	p
		Female (n=273)		Male (n=163)					
		n	%	n	%	n	%		
Marital Status	**Married**	99	36.3	91	55.8	190	43.6	15.889	<0.001*
	Single	174	63.7	72	44.2	246	56.4		
Occupation	**Civil servant**	62	22.7	60	36.8	122	28.0	11.312	0.003*
	Student	119	43.6	51	31.3	170	39.0		
	Other	92	33.7	52	31.9	144	33.0		
Education Status	**High school and below**	43	15.8	34	20.9	77	17.7	1.831	0.176
	University and above	230	84.2	129	79.1	359	82.3		
Monthly Income	**<2000 TL**	107	39.2	39	23.9	146	33.5	22.980	<0.001**
	2000-5000 TL	94	34.4	45	27.6	139	31.9		
	>5000 TL	72	26.4	79	48.5	151	34.6		
Doctor diagnosed disease	**Having disease**	53	19.4	32	19.6	85	19.5	0.003	0.956
	Disease-free	220	80.6	131	80.4	351	80.5		
Cigarette use	**Using**	70	25.6	70	42.9	140	32.1	14.018	<0.001**
	Not using	203	74.4	93	57.1	296	67.9		
Alcohol consumption	**Consuming**	64	23.4	39	23.9	103	23.6	0.013	0.909
	Non-consuming	209	76.6	124	76.1	333	76.4		
BMI classes	**Underweight**	31	11.4	4	2.5	35	8	60.549	<0.001*
	Normal	172	63.0	58	35.6	230	52.8		
	Overweight	52	19.0	66	40.5	118	27.1		
	Obese	18	6.6	35	21.5	53	12.2		
Meal skipping status	**Yes**	125	45.8	60	36.8	185	42.4	7.399	0.025*
	No	40	14.7	40	24.5	80	18.3		
	Sometimes	108	39.6	63	38.7	171	39.2		

Reason for skipping meals	**I dont want**	143	61.1	53	43.8	196	55.2	12.009	0.007*
	To lose weight	19	8.1	14	11.6	33	9.3		
	I do not have time	52	22.2	45	37.2	97	27.3		
	Other	20	8.5	9	7.4	29	8.2		
How you eat food	**Slowly**	48	17.6	19	11.7	67	15.4	20.035	<0.001**
	Fast	82	30.0	84	51.5	166	38.1		
	Normal	143	52.4	60	36.8	203	46.6		

Pearson chi square test was used. *p<0.05 **p<0.001

TFEQ-R18 factor scores of the participants did not change significantly according to meal skipping status (p>0.05).

TFEQ-R18 factor scores were evaluated according to gender. The mean ranks of women's cognitive restraint score (p=0.036) and emotional eating score (p<0.001) were significantly higher than those of men. Uncontrolled eating and hunger sensitivity scores did not show a significant difference between genders (p>0.05) (Table 2).

Table 2. Participants' TFEQ-R18 Factor Scores by Gender

TFEQ-R18 Sub-factors	Gender	n	Rank mean	p
Cognitive restraint	Male	163	202.18	0.036*
	Female	273	228.24	
Uncontrolled eating	Male	163	217.72	0.920
	Female	273	218.97	
Emotional eating	Male	163	183.44	<0.001**
	Female	273	239.43	
Sensitivity to hunger	Male	163	215.85	0.733
	Female	273	220.08	

Mann-Whitney U test was used. *p<0.05 **p<0.001

TFEQ-R18 sub-factor scores of the participants were evaluated according to their BMI class. The scores of cognitive restraint (p<0.001), uncontrolled eating (p=0.001) and hunger sensitivity (p=0.021) factors showed a significant difference according to BMI class. Pairwise comparisons were made according to the adjusted p value. The cognitive restraint score was significantly different between underweight and normal weight participants (p<0.001), between underweight and overweight participants (p<0.001), between underweight and obese participants (p=0.014) and between overweight and obese participants (p=0.048). The mean ranks of the cognitive restraint score of the underweight participants were lower than all other groups and those of the obese participants were lower than those of the overweight participants. A significant difference was found between overweight and obese participants (p=0.001) and normal and obese participants (p=0.003) in terms of uncontrolled eating score. Obese participants had a higher mean ranking of the uncontrolled eating score than normal and overweight participants. The hunger sensitivity score was significantly different between normal and obese participants (p=0.024) and was significantly higher in obese

participants compared to normal participants. TFEQ-R18 subscale scores were compared according to the physical activity status of the participants. The cognitive restraint score differed significantly according to physical activity status. A significant difference was found between those who did not do physical activity and those who did it 1-3 times (p=0.002) and between those who did not do physical activity and those who did it 3-5 times (p<0.001). The mean ranks of the cognitive restraint score of those who performed physical activity 1-3 or 3-5 times a week were higher than those who did not perform physical activity. No significant difference was found in other subscale scores according to physical activity status (p>0.05) (Table 3).

Table 3. TFEQ-R18 Factor Scores According to Participants' BMI Classes and Physical Activity Status

TFEQ-R18 Sub-factors	BMI Classses	n	Rank mean	χ2	p	Difference
Cognitive restraint	Underweight[1]	35	113.43	34.581	<0.001**	1-2
	Normal[2]	230	222.42			1-3
	Overweight[3]	118	251.79			1-4
	Obese[4]	53	196.75			3-4
Uncontrolled eating	Underweight[1]	35	225.93	15.970	0.001*	2-4
	Normal[2]	230	213.40			3-4
	Overweight[3]	118	198.81			
	Obese[4]	53	279.58			
Emotional eating	Underweight	35	211.30	6.203	0.102	
	Normal	230	215.57			
	Overweight	118	208.75			
	Obese	53	257.67			
Sensitivity to hunger	Underweight[1]	35	195.29	9.717	0.021*	2-4
	Normal[2]	230	211.86			
	Overweight[3]	118	216.65			
	Obese[4]	53	266.77			
Physical Activity Status						
Cognitive restraint	No physical activity[1]	151	185.25	22.705	<0.001*	1-3
	1 time a week[2]	65	203.93			1-4
	1-3 times a week[3]	138	239.10			
	3-5 times a week[4]	82	256.60			
Uncontrolled eating	No physical activity	151	222.37	2.786	0.426	
	1 time a week	65	237.77			
	1-3 times a week	138	207.77			
	3-5 times a week	82	214.15			
Emotional eating	No physical activity	151	219.30	0.699	0.873	
	1 time a week	65	228.43			
	1-3 times a week	138	217.15			
	3-5 times a week	82	211.43			
Sensitivity to hunger	No physical activity	151	224.80	2.381	0.497	
	1 time a week	65	232.43			
	1-3 times a week	138	212.99			
	3-5 times a week	82	205.13			

Kruskal Wallis Test was used. *p<0.05 **p<0.001

Discussion

The research was completed with 436 participants, 273 females and 163 males, and more than half of the participants were in the normal BMI range. While the rate of skipping meals was higher in women, TFEQ-R18 scores of the participants did not show a significant difference according to meal skipping status. Some sub-factor scores of eating behaviors changed significantly according to the gender, BMI, and physical activity status of the participants.

In our study, emotional eating and cognitive restraint scores were significantly higher in women than in men. Similarly, in a study of 626 office workers aged 18-65 in Turkey, it was determined that women had higher emotional eating and cognitive restraint behavior scores than men[16]. In another study involving adolescents and their parents. 379 parents and 260 children between the ages of 34 and 67 were studied, and it was found that cognitive restraint and emotional eating were higher in women than in men in both groups[17]. In a survey conducted in Iran with 247 university students, it was found that women had higher emotional eating scores than men[18]. A study conducted in China with 424 university students supported these findings by reporting that women were more than three times more likely to have negative emotional eating compared to men[6]. A systematic review examined the psychological determinants of Black women's emotional eating behaviors; it was suggested that negative emotions, especially perceived stress trigger emotional eating[19]. Stress perceived by individuals is associated with more emotional eating[20]; in a study of 345 college students in the United States, 227 of whom were female, it was reported that women had higher stress and more emotional eating[21]. In support of these findings, a study of 301 undergraduate students found that females were more likely to report depression, anxiety and stress than males and were more likely to apply to food to combat stress than males[22]. In addition there are different studies reporting that cognitive restraint scores are higher in females compared to males. In 281 students aged 12-27 years in Spain, cognitive restraint was shown to be higher in females than in males and more restricted eating has been associated with female gender[23]. A study in France in which 1000 young participants aged between 20 and 39 years were administered the TFEQ questionnaire showed that both dietary restriction and disinhibition scores were significantly higher in women compared to men[24]. Thus, our results are consistent with other results reporting higher emotional eating and cognitive restraint scores in women in different populations. Women tended to show higher TEFQ scores compared to men[25]. Zakhour et al. investigated the effect of the interaction of gender and body dissatisfaction on eating disorders in a study with 811 adults in Lebanon. They found that restrained eating and emotional eating were associated with body dissatisfaction and that body dissatisfaction was significantly associated with more restrained eating, especially among women[26]. In contrast to these results and our findings, there are also studies reporting that no difference was observed between genders in terms of TFEQ subscale scores in university students[27]. The findings suggest that more perceived stress and body dissatisfaction may contribute to the higher frequency of emotional eating and cognitive restraint in women compared to men. In addition in our study group the higher rate of skipping meals and being underweight in women compared to men may be related to higher cognitive restraint scores in women.

In this study, while the cognitive restraint score of underweight individuals was lower than all other BMI groups, the cognitive restraint score of obese participants was lower than that of overweight participants. Uncontrolled eating and hunger sensitivity scores were found to be higher in obese individuals than in normal participants. Similarly, in a study of 256 university students in our country, it was determined that the cognitive restraint score of lean individuals was lower than that of normal and overweight individuals[5]. The finding that the cognitive restraint score of overweight and obese participants among students in Spain was higher than that of other groups supports these findings[23]. In 378 adults aged 20-45 years living in the Turkish Republic of Northern Cyprus, it was found that the cognitive restraint score of overweight participants was higher than that of individuals with normal body weight and obese participants had a higher uncontrolled eating score compared to lean participants[28]. According to a study of 351 university students in Libya there is a positive relationship between BMI and cognitive restraint, emotional eating and uncontrolled eating, and this relationship is significant in women[29]. Similarly, in a sample of 2.997 Finnish women aged 17 to 20 years, higher BMI was associated with higher levels of emotional eating and cognitive restraint[30]. In a Brazilian study involving 410 undergraduate students, found a positive correlation between BMI and cognitive restraint and emotional eating[25]. A study in which higher BMI was found to be associated with more restrictive nutrition was also conducted in Lebanon[26]. This suggests that overweight and obese individuals may have a tendency towards cognitive restraint for weight loss. Increased sensitivity to hunger in obese individuals may affect uncontrolled eating behavior and obesity and uncontrolled eating may be considered to be associated. Although our study did not show a significant difference between different BMI groups in terms of emotional eating scores, previous studies have reported a positive relationship between BMI and emotional eating. According to the study, which investigated the relationship between emotional eating and BMI in an international sample of 226 adults, overweight or obese participants had higher levels of emotional eating than normal weight participants[31]; a similar result was reported by Amoako et al. for women in university students[27]. In a prospective study, emotional eating was predicted to cause a higher increase in BMI over 7 years in Finnish people aged 25-74 years[32]. In a cross-sectional study of 1392 university students in the United States of America (US), the Netherlands, South Korea, Malaysia, Ireland, Ghana and China, it was reported that emotional eating mediated the relationship between perceived stress and BMI[33]; therefore the contribution of emotional eating to increased BMI is understandable. A population-based cohort study in Germany included 3,144 participants aged 40-79 years. Those who showed the highest BMI values in the study had higher than average scores for uncontrolled eating and emotional eating[34]. In addition in 60 healthy adult men aged 18-62 years, participants who were overweight had higher levels of disinhibition and hunger compared to those of normal[35]. In a study of 1471 men and 2381 women from two US cohorts, Cornelis et al. determined that emotional eating, cognitive restraint and uncontrolled eating were positively correlated with each other and with BMI[36]. Based on these findings, it is thought that TEFQ sub-factor scores are generally positively correlated with BMI, and the high cognitive restraint, uncontrolled eating and hunger sensitivity scores of participants in high BMI classes in our study are compatible with the literature.

In this study, physical activity status was only associated with cognitive restraint, and participants who engaged in physical activity 1-3 or 3-5 times a week had higher cognitive restraint scores than sedentary participants. This finding is consistent with the study conducted with 626 office workers, which found a positive correlation between total physical activity scores and cognitive restraint in adult men[16]. In the study conducted by Jáuregui-Lobera et al. with students in Spain, a positive correlation was reported between sedentary life and uncontrolled eating, while no difference was observed in other factors[23]. Considering the strong links between physical inactivity and obesity[37], these results suggest that a physically active lifestyle may be associated with cognitive restraint and may be protective against behaviors such as uncontrolled eating. In contrast, in 139 young adults aged 18-25 years, sedentary lifestyle was inversely associated with uncontrolled eating and low moderate and moderate-to-vigorous physical activity was positively associated with emotional eating and uncontrolled eating. This was thought to be due to the idea that physical activity deserves reward[38].

The strengths of this study are that it addressed eating behaviors in men and women in an adult sample according to different characteristics. This study has some limitations. Since the study was planned as a cross-sectional study, it cannot provide a cause-effect relationship. The number of female respondents was higher than man, and the results could not be generalized to those living in different regions and different age groups because it included participants in a certain region and age range. Limitations of the study include the fact that the surveys were conducted online and that information such as body weight and height were obtained based on self-reporting. Our study is important in terms of better understanding the factors affecting eating behaviors in adults, correcting the mistakes in eating behaviors and guiding interventions to gain healthy eating habits.

Conclusions

According to our study with adult participants, some sub-factor scores of eating behaviors differed according to gender, BMI and physical activity status. Cognitive restraint increased in females, thin individuals, and those with a higher frequency of physical activity. Uncontrolled eating score was higher in obese individuals compared to normal participants, and emotional eating score increased in female gender. Understanding the effect of differences in characteristics such as BMI, gender and physical activity status on eating behaviors will shed light on intervention and prevention efforts in this field. Longitudinal studies with diverse populations are necessary to explore causal links between eating behaviors and demographic characteristics. It is thought that more comprehensive and longitudinal studies on the subject will be useful in revealing cause and effect relationships.

Conflict of Interest and Financial Support

There is no conflict of interest regarding the article. No financial support was received for the conduct of the study.

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International Health Tourism: A Strategic Comparison of Türkiye and Germany

Canan BULUT*

Abstract

Aim: This study aims to conduct an in-depth analysis of the competitive dynamics of health tourism in Türkiye and Germany by utilizing current data. The primary goal is to identify the strategic advantages and challenges each country faces within the health tourism sector.

Method: The research employs a comparative approach, analyzing quantitative data related to healthcare costs, treatment options, service quality, patient safety, and satisfaction levels in both Türkiye and Germany. Secondary data sources, such as industry reports and healthcare statistics, form the foundation of this analysis.

Results: The study reveals that Türkiye emerges as an attractive destination due to its cost advantages, with healthcare services being 50-70% lower compared to Germany, alongside a wide variety of treatment options. Its geographical position and accessibility further enhance its appeal to health tourists. In contrast, Germany is recognized for its high-quality healthcare services, accredited hospitals, and specialized professionals, ensuring patient safety and treatment excellence. Both countries report high patient satisfaction rates; however, Türkiye faces certain service-related challenges that can impact the patient experience negatively.

Conclusion: This research presents a clear overview of the strategic positions and potential growth areas of both Türkiye and Germany in health tourism. It serves as a valuable reference for future development strategies aimed at strengthening their competitive standings in the international health tourism market.

Keywords: Health tourism, patient satisfaction, cost, health policy.

Uluslararası Sağlık Turizmi: Türkiye ve Almanya'nın Stratejik Karşılaştırması

Öz

Amaç: Bu çalışma, Türkiye ve Almanya'daki sağlık turizminin rekabetçi dinamiklerini güncel veriler kullanarak derinlemesine analiz etmeyi amaçlamaktadır. Temel hedef, her iki ülkenin sağlık turizmi sektöründeki stratejik avantajlarını ve karşılaştıkları zorlukları belirlemektir.

Yöntem: Araştırma, Türkiye ve Almanya'daki sağlık hizmetleri maliyetleri, tedavi seçenekleri, hizmet kalitesi, hasta güvenliği ve memnuniyet seviyeleri ile ilgili niceliksel verileri analiz eden karşılaştırmalı bir yaklaşım benimsemektedir. Bu analiz, sektör raporları ve sağlık istatistikleri gibi ikincil veri kaynaklarına dayanmaktadır.

Bulgular: Çalışma, Türkiye'nin maliyet avantajlarıyla dikkat çeken bir destinasyon olarak öne çıktığını ortaya koymaktadır; Türkiye'nin sağlık hizmetleri Almanya'ya kıyasla %50-70 daha düşük maliyetlerle sunulmakta ve çok çeşitli tedavi seçenekleri sunulmaktadır. Coğrafi konumu ve erişilebilirliği de sağlık turistleri için cazibesini artırmaktadır. Öte yandan, Almanya yüksek kaliteli sağlık hizmetleri, akredite hastaneler ve uzmanlaşmış profesyonelleri ile hasta güvenliği ve tedavi mükemmeliyetini garanti etmektedir. Her iki ülke de yüksek hasta memnuniyeti oranlarına sahipken, Türkiye'nin bazı hizmetle ilgili zorlukları, hasta deneyimini olumsuz yönde etkileyebilmektedir.

Sonuç: Bu araştırma, Türkiye ve Almanya'nın sağlık turizmindeki stratejik konumları ve potansiyel büyüme alanları hakkında net bir genel bakış sunmaktadır. Bu çalışma, her iki ülkenin uluslararası sağlık turizmi

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pazarındaki rekabetçi konumlarını güçlendirmeye yönelik gelecekteki gelişim stratejileri için değerli bir referans sağlamaktadır.

Anahtar Sözcükler: Sağlık turizmi, hasta memnuniyeti, maliyet, sağlık politikası.

Introduction

Health tourism, which involves international travel for medical care, has become a rapidly expanding sector in recent years. This sector has gained increasing attention due to its ability to offer access to high-quality healthcare, cost advantages, and diverse treatment options[1]. Türkiye and Germany have emerged as key destinations in this field, with notable differences in the services they provide to international patients.

Türkiye has positioned itself as a significant hub for health tourism, particularly in fields such as aesthetic surgery, dentistry, and in vitro fertilization (IVF). This success is attributed to its strategic geographical location, rich historical background, and advanced healthcare infrastructure[2-4]. Competitive pricing and a wide variety of treatment options make Türkiye an attractive destination for health tourists[3]. Conversely, Germany is known for its high-quality healthcare services, renowned specialized professionals, and cutting-edge medical technology, making it a trusted destination for international patients, especially in fields such as oncology and cardiology[5].

The objective of this study is to compare current health tourism data between Türkiye and Germany, assessing each country's strengths and weaknesses. By doing so, this research aims to offer strategic insights for countries striving to enhance their competitiveness in the global health tourism market[2].

Literature Review

Health tourism, which involves international travel for medical care, has become a rapidly expanding sector in recent years. This growth can be attributed to its ability to offer access to high-quality healthcare services, cost advantages, and a diverse range of treatment options[1]. Both Türkiye and Germany have emerged as significant players in the global health tourism market, with each country offering unique services to international patients.

Türkiye has become an important destination for health tourism, particularly in fields such as aesthetic surgery, dentistry, and in vitro fertilization (IVF). The country's geographical location, historical background, and rapidly advancing healthcare infrastructure have played a major role in this success[4]. Competitive pricing and the availability of a broad range of treatments position Türkiye as an attractive choice for health tourists seeking affordable yet high-quality care[3]. On the other hand, Germany is known for its high-quality healthcare services, specialized healthcare professionals, and state-of-the-art medical technology, which have contributed to its status as a trusted destination for international patients, particularly in specialized fields such as oncology and cardiology[5].

Türkiye's strategic position at the crossroads of Europe and Asia makes it easily accessible to patients from both regions, adding to its appeal in the health tourism sector. Furthermore, its health tourism statistics indicate a rapid increase in the number of

international patients, as it continues to build on its strong healthcare system and establish itself as a global leader[3]. Conversely, Germany's healthcare sector stands out due to its advanced medical technology and internationally recognized medical professionals, positioning it as a leader in specialized treatments[6].

This study aims to compare current health tourism data between Türkiye and Germany, analyzing the strengths and weaknesses of each country. By assessing the respective healthcare infrastructure, patient satisfaction, and cost-effectiveness in each destination, the study provides insights into the factors driving the competitiveness of both countries in the health tourism industry[2]. The findings of this research are valuable for countries striving to improve their health tourism sectors and enhance their competitive standing in the global market.

The analysis will focus on various dimensions of health tourism, including patient satisfaction, healthcare quality, costs, and the effectiveness of marketing strategies in attracting international patients. While Türkiye has made significant strides in offering cost-effective healthcare services, Germany's reputation for top-tier medical technology and expertise continues to draw international patients, particularly for complex treatments[7-11]. Furthermore, studies on health tourism satisfaction and its impact on patient decisions highlight the importance of both cost and quality in influencing patients' choices of destination[9].

This comparison is critical for understanding how both countries can capitalize on their strengths and address their weaknesses to better cater to the growing global demand for medical tourism. The research aims to offer strategic recommendations based on the current trends in health tourism and the economic impact of medical tourism on both countries[7-8].

The literature frequently discusses the competitive implications of Türkiye's cost advantages in health tourism and Germany's provision of high technology[1]. Additionally, determining patient satisfaction levels in both countries and analyzing the factors affecting this satisfaction play a significant role in the development of health tourism strategies[2].

Building on the aforementioned studies, this research aims to gain a deeper understanding of Türkiye and Germany's competitive positions in health tourism[3]. The investigation of factors influencing health tourists' preferences is intended to contribute to the development of health tourism strategies in both countries. Understanding these differences is crucial for developing effective health tourism strategies. This research addresses the following key research questions:

What are the main differences between Türkiye and Germany in terms of health tourism services and competitive advantages?

How do healthcare quality, patient satisfaction, and cost structures impact the health tourism sector in Türkiye and Germany?

What factors influence international patients' choices when selecting Türkiye or Germany for medical treatment?

How can both countries improve their health tourism strategies to strengthen their positions in the global health tourism market?

This study is based on a descriptive research model aimed at comparing the current data on health tourism in Türkiye and Germany. The research seeks to analyze various quantitative data to evaluate the health tourism potential of both countries.

The primary data for the research has been obtained from official sources containing statistical information related to health tourism in Türkiye and Germany[4-8]. Specifically, health tourism statistics, patient satisfaction reports, and accreditation data for the period 2018-2022 were obtained from the Türkiye Ministry of Health; annual reports and statistics related to health tourism from the Federal Statistical Office of Germany; data on accredited hospitals from Joint Commission International (JCI); and general statistics and cost reports related to health tourism from the World Data Bank and OECD.

The collected data will be utilized to conduct a comparative analysis of both countries' positions in the health tourism market and their growth potentials. The analysis will be structured around the following topics[9]:

Visitor Numbers: Annual numbers of health tourists arriving in Türkiye and Germany.

Cost Structures: Economic differences in the provision of healthcare services between the two countries based on the costs of specific types of treatment.

Patient Satisfaction: Survey results and statistics indicating the levels of satisfaction among health tourists in both countries.

Treatment Diversity: An analysis of the preferred treatment areas among health tourists.

Material and Methods

This study is a descriptive and comparative research that analyzes the health tourism sectors of Türkiye and Germany from a strategic perspective. The study employs secondary data analysis to examine the key advantages, challenges, and competitive positions of both countries in the health tourism sector.

The research is guided by the following key questions.

What are the main differences between Türkiye and Germany in terms of health tourism?

Which factors influence health tourists' preference for Türkiye or Germany?

How do Türkiye and Germany compare in terms of healthcare quality, costs, and patient satisfaction?

These research questions provide a framework for analyzing health tourism trends, patient satisfaction, service quality, and cost structures in both countries.

Data Sources: The primary data for this study was obtained from official national sources, including health tourism statistics, patient satisfaction surveys, and accreditation data from relevant authorities. These include:

Türkiye Ministry of Health: Official health tourism statistics and patient satisfaction reports from 2018 to 2022 were analyzed[4,10].

Federal Statistical Office of Germany (Destatis): Health tourism reports, including demographic data and tourism statistics, were utilized to compare the health tourism trends between the two countries[6].

Joint Commission International (JCI): Data on accredited hospitals in both Türkiye and Germany was reviewed to assess the quality standards in healthcare services[5].

OECD and World Data Bank: Reports from the OECD and World Data Bank provided additional insights into healthcare costs, patient satisfaction rates, and key economic indicators related to health tourism[7,8].

Research Methodology: A **descriptive research model** was applied to compare the health tourism potential of Türkiye and Germany. This model focuses on evaluating key indicators related to health tourism, such as the number of health tourists, treatment costs, and patient satisfaction. The data was analyzed using a **comparative analysis approach**, allowing for a direct comparison between both countries' health tourism sectors.

Visitor Numbers: Data on the annual number of international health tourists visiting Türkiye and Germany from 2018 to 2022 were collected to determine trends in health tourism volumes[4,7,8,10,12].

Cost Structures: The study examined economic differences in healthcare service provision between Türkiye and Germany, focusing on treatment costs for popular health tourism services such as aesthetic surgery, dental implants, and orthopedic surgeries. The cost data was extracted from official statistics and reports from both countries[4,8].

Patient Satisfaction: Surveys and statistics on patient satisfaction in both countries were analyzed to evaluate how well health tourists perceive the healthcare services provided. This included data from government and industry reports on healthcare satisfaction in Türkiye and Germany[4,6,7].

Treatment Diversity: The study analyzed the variety of treatments offered in each country, focusing on the most popular areas of treatment such as aesthetic surgery, fertility treatments, and oncology.

Data Analysis Methodology: This study employs a **comparative analysis approach** to evaluate the health tourism sectors of Türkiye and Germany. The collected data has been analyzed based on the following key indicators:

Number of Health Tourists: The annual number of international patients visiting Türkiye and Germany for medical purposes.

Cost Structures: A comparison of treatment costs for selected medical services in Türkiye and Germany.

Patient Satisfaction: An assessment of patient satisfaction levels based on surveys and reports from both countries.

Diversity of Treatments: An analysis of the most sought-after medical services in each country, including aesthetic surgery, orthopedics, oncology, and dental treatments.

The data has been analyzed using **descriptive statistics**, with key findings presented in tables and figures to highlight the differences between Türkiye and Germany in the health tourism market.

Ethical Considerations: This study used publicly available secondary data from reputable sources such as government health ministries, statistical offices, and international organizations. No direct patient or personal data was used, and all information utilized for analysis was anonymized and aggregated. As the study was based solely on secondary data, ethical approval was not required.

Results

Data on Health Tourism

Health tourism is a rapidly developing sector worldwide, influenced by factors such as changing patient demands, cost advantages, and access to various treatment options[10]. Health tourism data plays a critical role in understanding the provision of healthcare services and the competitive advantages of different countries[11]. The current data on health tourism in Türkiye and Germany reveals the strengths and weaknesses of each country's healthcare systems, providing potential health tourists with the opportunity for comparison. This section aims to detail important indicators of health tourism data in Türkiye and Germany, focusing on visitor numbers, cost structures, and patient satisfaction.

Table 1. Population and change rates of Türkiye and Germany in the last 5 years

Year	Population of Türkiye (Million)	Population Change Rate in Türkiye (%)	Population of Germany (Million)	Population Change Rate in Germany (%)
2018	82.00	1.50	82.97	0.3
2019	82.58	1.09	83.02	0.38
2020	83.38	0.97	83.17	0.18
2021	84.15	0.92	83.24	0.08
2022	84.98	0.99	83.29	0.06

In the last five years, Türkiye's population has increased from 82.58 million to 85.33 million. During this period, Türkiye's annual population growth rate has been calculated at an average of 0.99%. This population increase can be attributed to Türkiye's young and dynamic demographic structure. High fertility rates and migration factors are among the primary reasons for this growth (Table 1).

In contrast, Germany's population has risen from approximately 83.02 million to 83.54 million over the same period, with an average annual population change rate of 0.30%. The population growth in Germany is relatively modest compared to Türkiye, reflecting the effects of an aging demographic structure and migration policies. While Germany faces lower fertility rates, migration plays a significant role in population growth (Table 1).

Table 2. Total number of tourists visiting Türkiye and Germany in the last 5 years, and those visiting for health tourism

Year	Total Number of Tourists Visiting Türkiye (Million)	Number of Tourists Visiting Türkiye for Health Tourism	Total Number of Tourists Visiting Germany (Million)	Number of Tourists Visiting Germany for Health Tourism
2018	45	500	38	250
2019	45	600	39,6	275
2020	15	388	12	200
2021	30	642,444	9,7	250
2022	51	1.2 million	31	270

In 2022, Türkiye hosted a total of 51 million tourists, up from approximately 45 million in 2019, prior to the pandemic. That year, Türkiye saw significant growth in health tourism, attracting 1.2 million health tourists, which represents a 66% increase compared to 2021, when 642,444 health tourists were welcomed (Table 2). The most sought-after treatments in Türkiye include dental services, orthopedic surgeries, and aesthetic surgery. In 2022, the revenue from health tourism exceeded $2.1 billion[7].

Germany welcomed approximately 9.7 million international tourists in 2021, down from around 39.6 million in 2019 due to the pandemic's impact. However, tourism began to recover in 2022. Germany attracts about 250,000 health tourists annually (Table 2). German health tourism is primarily distinguished by its advanced medical technology and specialized treatments, although the total number of health tourists remains lower compared to Türkiye[12].

Türkiye has demonstrated rapid growth in health tourism, supported by low costs, a wide range of treatment options, and advanced infrastructures in areas such as cosmetic and dental services. Conversely, Germany stands out in health tourism primarily for its advanced technology and high-risk specialized treatments (Table 2). Nevertheless, Germany attracts fewer health tourists compared to Türkiye's health tourism volume[7,12].

Table 3. Major treatment areas for patients visiting Türkiye and Germany for health tourism

Treatment Area	Percentage of Patients Visiting Türkiye (%)	Percentage of Patients Visiting Germany (%)
Dental Health (Implants, Aesthetic Dental Treatment)	30%	10%
Aesthetic and Plastic Surgery	25%	15%
Eye Surgery (Laser Eye Surgery)	15%	5%
Orthopedic Surgeries (Knee Replacement, Hip Replacement)	10%	25%
Heart Surgery	5%	20%
Oncology Treatment (Cancer Treatment)	3%	15%
Rehabilitation Services	5%	10%
In Vitro Fertilization (IVF)	7%	5%

Türkiye stands out for its affordable and high-quality services in areas such as dental health (30%), aesthetic surgery (25%), and eye surgery (15%). The country receives significant demand for dental implants and aesthetic surgeries from many European countries and the Middle East[5,7].

Germany, on the other hand, is preferred as a health tourism destination primarily for orthopedic surgeries (25%), heart surgeries (20%), and oncology treatments (15%) (Table 3). Germany is particularly favored for complex and high-risk treatments due to the advanced technology and specialized physicians it offers in these fields[5,7].

Table 4. Number of accredited healthcare institutions in Türkiye and Germany by JCI for the years 2018-2022

Year	Number of Accredited Hospitals in Türkiye	Number of Accredited Hospitals in Germany
2018	45	250
2019	47	260
2020	48	270
2021	50	275
2022	52	280

In Türkiye, the quality of healthcare services is assessed by international accreditation organizations such as the Joint Commission International (JCI) and ISO 9001[13,14]. Hospitals in Türkiye, particularly in major cities, place significant importance on obtaining these accreditations (Table 4). The Turkish Ministry of Health aims to align all healthcare institutions with local and international standards through the implementation of Health Quality Standards (SKS)[5,13-16]. As of 2022, more than 50 hospitals in Türkiye have been accredited by JCI. To enhance the quality of healthcare services in Türkiye, the Ministry of Health mandates the implementation of SKS in all healthcare institutions. These standards encompass criteria such as patient safety, service quality, and patient satisfaction (Table 4). The reforms implemented post-2020 aim to make the SKS processes more effective[5,16,17].

In Germany, healthcare institutions generally adhere to international quality standards. Germany operates a healthcare system that implements quality management systems such as DIN EN ISO 9001 and Kooperation für Transparenz und Qualität im Gesundheitswesen (KTQ). University hospitals and private hospitals, in particular, are quite active in pursuing international accreditations. Many hospitals in Germany are involved in both national and international accreditation processes. Additionally, there are hospitals with JCI certification. Healthcare services in Germany are typically based on quality management standards such as ISO 9001 and the EFQM Excellence Model. These standards are applied to enhance both patient safety and the effectiveness of treatment processes. Furthermore, hospitals in Germany are working towards developing a patient-centered service approach through KTQ accreditations[5,18].

Table 5. Average service costs in health tourism in Türkiye and Germany for the years 2018-2022

Country	Treatment Type / Year	Dental Implant	Heart Bypass Surgery	Laser Eye Surgery	Knee Replacement Surgery	Liposuction	Aesthetic Nose Surgery
Türkiye	2018	$500	$12,000	$1,200	$8,000	$2,000	$2,500
	2019	$550	$13,000	$1,300	$8,500	$2,200	$2,600
	2020	$600	$14,000	$1,400	$9,000	$2,300	$2,700
	2021	$650	$14,500	$1,450	$9,500	$2,500	$2,800
	2022	$700	$15,000	$1,500	$10,000	$2,800	$3,000
Germany	2018	$3,500	$40,000	$4,500	$25,000	$6,500	$7,000
	2019	$3,600	$42,000	$4,600	$26,000	$7,000	$7,200
	2020	$3,800	$43,000	$4,700	$27,000	$7,200	$7,400
	2021	$4,000	$44,000	$4,800	$28,000	$7,500	$7,600
	2022	$4,200	$45,000	$5,000	$29,000	$8,000	$8,000

Türkiye continues to be a highly competitive destination for health tourism in terms of service costs. From 2018 to 2022, while costs for various treatment types have increased, prices in Türkiye remain significantly lower compared to those in Germany (Table 5). Germany offers health tourism services at higher costs, which are attributed to advanced technologies and specialized treatments that require significant expertise. Although prices in Germany have steadily increased over the years, the overall costs are still much higher when compared to Türkiye[7,12].

Table 6. Health tourism revenues in Türkiye and Germany for the years 2018-2022 (Billion USD)

Year	Health Tourism Revenue in Türkiye (Billion USD)	Health Tourism Revenue in Germany (Billion USD)
2018	1,5	1,2
2019	1,65	1,3
2020	1,05 (Pandemic Impact)	0,9 (Pandemic Impact)
2021	1,75	1,1
2022	2,1	1,1

Türkiye has demonstrated a steady increase in health tourism revenues between 2018 and 2022. Although there was a decline in 2020 due to the COVID-19 pandemic, Türkiye experienced a significant recovery in health tourism in 2021 and 2022 (Table 6). By 2022, Türkiye's revenue from health tourism reached approximately $2.1 billion[19,20].

While Germany has a smaller health tourism market compared to Türkiye, it generates significant revenues due to advanced technology and specialized treatments. However, Germany's revenue growth has been slower due to Türkiye's broader range of treatment options and cost advantages (Table 6). Germany particularly excels in generating high revenues from treatments such as heart surgery, oncology, and orthopedics[6,21].

Table 7. Patient satisfaction rates of health tourists visiting Türkiye and Germany for the years 2018-2022

Year	Patient Satisfaction in Türkiye (%)	Patient Satisfaction in Germany (%)
2018	85%	90%
2019	87%	91%
2020	82% (Pandemic Impact)	88% (Pandemic Impact)
2021	86%	89%
2022	88%	91%

Türkiye achieves high satisfaction rates among health tourism patients due to competitive prices and rapid treatment times. Satisfaction levels are particularly high in areas such as aesthetic surgery, eye treatments, and dental health. Although there was a general decline in satisfaction due to the COVID-19 pandemic in 2020, patient satisfaction in Türkiye rose again to 88% in 2022[22].

Germany, on the other hand, generally boasts higher satisfaction rates due to its advanced technological infrastructure, specialized physicians, and high treatment quality. Patients seeking high-tech treatments such as heart surgery, oncology, and orthopedics in Germany typically report satisfaction rates of 90% or above[6].

Health tourism is one of Türkiye's economic and strategic objectives. Between 2018 and 2022, the Turkish Ministry of Health provided various incentives to develop health tourism through the International Health Services Inc.[23]. These incentives include the provision of healthcare services in accordance with international standards, promotional campaigns, investments in private hospitals, and support for health tourism companies (Table 7). Additionally, Türkiye has developed an expedited accreditation system for health tourism services, aligning the quality of healthcare nationwide with international standards such as JCI and ISO[23,24].

In Germany, health tourism primarily focuses on high-tech treatments that require specialized expertise. The country's health tourism policies are supported by advanced medical devices and skilled healthcare professionals[25]. Health policies are typically implemented through university hospitals and private healthcare institutions, concentrating on areas such as cancer treatments, orthopedic surgeries, and cardiovascular diseases (Table 7). Germany promotes cross-border healthcare services in close cooperation with EU countries[26,27].

Table 8. Visa information for health tourism travel to Türkiye and Germany

Country	Visa Type	Required Documents	Visa Duration	Visa Processing Time	Visa Fee
Türkiye	C Type Health Visa	Invitation letter, financial proof, travel insurance	Up to 90 days	1-5 business days	30-90 USD
Germany	Schengen / National Health Visa	Invitation letter, proof of treatment payment, accommodation document	90 days or longer	3 weeks or longer	80-100 Euro

Patients coming to Türkiye for health tourism typically need to obtain a "C Type Health Visa." The visa application process includes documents such as an official invitation letter from the hospital or clinic, proof of financial resources, travel insurance, and travel documents. Visa applications can be submitted through Türkiye's official e-visa platform or via consulates (Table 8). The processing time for visas generally takes 1 to 5 business days, with visa fees ranging from 30 to 90 USD[28].

For patients wishing to travel to Germany for health tourism, a "Schengen Health Visa" or a "National Health Visa" for long-term treatments is required. A Schengen visa is necessary for short-term treatments, while a national visa must be obtained for treatments lasting more than three months. Required documents for the visa application include an invitation letter from the hospital or clinic, proof of payment for medical treatment expenses, and documentation of accommodation (Table 8). The visa application process usually takes about 3 weeks, but it can be expedited in urgent situations[29].

Türkiye has shown a high growth rate in health tourism due to its cost-effective services, advanced technology, and wide range of treatment options[17]. Although there was a decline in 2020 due to the COVID-19 pandemic, a rapid recovery was observed in 2021 and 2022. Particularly high demand in cosmetic surgery and dental treatments has contributed significantly to the rapid growth of the market[30]. Germany's health tourism market has exhibited more stable growth, focusing on treatments that require advanced technology. German health tourism has shown limited growth, particularly in complex procedures such as cancer treatments, cardiovascular surgeries, and orthopedic surgeries. Despite the decline during the pandemic, a steady recovery was noted in 2022[25,31].

Table 9. Health tourism market growth rates in Türkiye and Germany

Year	Growth Rate in Türkiye (%)	Growth Rate in Germany (%)
2018	19,8	12
2019	22,6	13,2
2020	15,4	10
2021	23	11,5
2022	27	12,8

Türkiye's market growth has been supported by low costs and shorter waiting times. Particularly, hair transplants, dental treatments, and aesthetic surgeries have emerged as the most popular services. In contrast, Germany has experienced more limited yet stable growth in its market, driven by high-quality medical services and the use of advanced technology. Germany specializes in high-cost but complex medical procedures[30,32].

Figure 2. Competitive data for health tourism in Türkiye and Germany
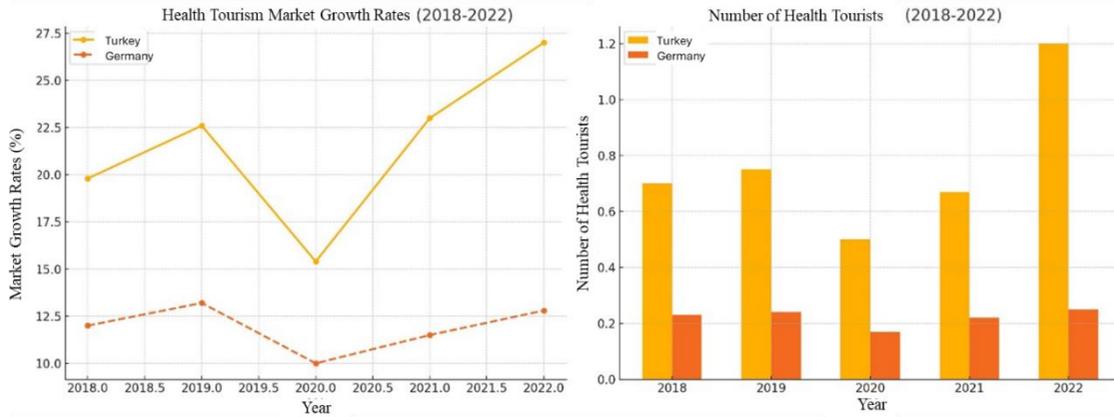
Türkiye's annual health tourism market growth rates exhibited a consistent increase from 2018 to 2022[33]. Despite a decline during the pandemic in 2020, a rapid recovery was observed in 2021 and 2022. The number of health tourists in Türkiye rose from approximately 700,000 in 2018 to 1.2 million in 2022. The country's competitive pricing and wide range of treatment options have attracted more international patients[34].

In contrast, Germany's annual market growth rates for health tourism have been lower, experiencing a decline in 2020 due to the pandemic. However, a limited recovery was noted in 2021 and 2022[35]. The number of health tourists in Germany increased from 230,000 in 2018 to 250,000 in 2022. Germany's complex treatments, based on advanced technology, attract fewer patients but result in higher revenue[36].

The analysis of these data aims to clarify the positions and growth potential of both countries in the health tourism market. Türkiye is particularly noted for its affordable and high-quality services in fields such as aesthetic surgery and dentistry, while Germany stands out for its high-tech healthcare services and specialized treatment methods. Research studies have identified factors influencing health tourists' preferences and satisfaction levels, contributing to the development of health tourism strategies in both countries[13-15,17,24-27].

In this context, the analysis of health tourism data from Türkiye and Germany provides a better understanding of the current health tourism potentials of these countries and establishes a significant foundation for developing strategies that cater to the needs of health tourists. The following paragraphs will detail the performances of both countries in light of recent data in the health tourism sector, yielding important insights into the competitive dynamics of the industry.

Conclusion and Recommendations

This study aimed to compare the current state of health tourism in Türkiye and Germany by analyzing key factors such as cost structures, patient satisfaction, healthcare quality, and accessibility. The findings highlight distinct advantages and challenges in both countries' health tourism sectors.

Türkiye is identified as a cost-effective destination that offers a diverse range of treatments, particularly in aesthetic surgery and dentistry, making it attractive to

international patients. Its geographical position, competitive pricing, and investment in health tourism infrastructure have contributed to its rapid market growth.

Conversely, Germany is distinguished by its advanced medical technology, high patient satisfaction rates, and specialized treatments in areas such as oncology and cardiology. However, challenges such as higher healthcare costs and longer waiting times may limit its ability to compete with more cost-effective destinations like Türkiye.

By assessing the key drivers influencing health tourists' preferences, this study provides insights into how both countries can strengthen their positions in the global health tourism market and improve their healthcare strategies.

Based on the findings of this study, the following recommendations are proposed:

Türkiye should prioritize accreditation processes to ensure compliance with international healthcare standards. The Ministry of Health can implement support programs to encourage hospitals to obtain certifications from organizations such as Joint Commission International (JCI). Strengthening accreditation will enhance healthcare quality and patient trust, reinforcing Türkiye's competitiveness in the global market.

Germany already upholds high accreditation standards, but efforts can be made to further streamline certification processes and enhance transparency in healthcare quality assessments.

Germany should explore strategies to manage and optimize healthcare costs, as its high service prices may discourage potential health tourists. Reviewing health policies to increase efficiency in service delivery and improve resource allocation could enhance cost-effectiveness.

Türkiye should continue leveraging its competitive pricing advantage, while also ensuring that affordable healthcare does not compromise service quality.

Türkiye should focus on promoting its affordability, accessibility, and service diversity through international campaigns and partnerships with medical travel agencies.

Germany should emphasize its specialized treatments, advanced technology, and high patient satisfaction rates to attract patients seeking high-risk or complex medical procedures.

Türkiye and Germany should conduct regular patient satisfaction surveys to evaluate tourists' healthcare experiences and identify areas for improvement.

The collected data should be integrated into decision-making processes to improve service quality and efficiency in both countries.

Türkiye and Germany could strengthen international cooperation in health tourism research**,** professional training, and medical education**.** Joint programs that support the exchange of expertise between healthcare professionals could improve overall service quality and innovation **i**n both countries.

These policy recommendations will help Türkiye and Germany assess their health tourism potential more effectively and improve their competitiveness in the global market. By focusing on accreditation, cost efficiency, marketing strategies, patient

satisfaction, and collaboration, both countries can further enhance their positions in the rapidly evolving health tourism industry.

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Yatan AMATEM Hastalarında Anti-HBs, HBsAg, Anti-HCV ve Anti-HIV Seroprevalansının ve İlişkili Faktörlerin İncelenmesi: 2020 Yılı Verileri

Mehmet Hamdi ÖRÜM*, Dilek ÖRÜM**

Öz

Amaç: Madde kullanımı ile viral hepatitlerin sıklığı arasındaki ilişki çeşitli çalışmalarda bildirilmiştir. Madde kullanım özelliklerinin zamanla değiştiği ve bölgesel farklılıklar gösterdiği bilinmektedir. Ülkemizde, madde kullanıcılarında viral hepatit belirteçlerini inceleyen çalışmalar yetersizdir. Bu çalışmada bir ruh sağlığı ve hastalıkları hastanesinin Alkol ve Madde Bağımlıları Tedavi ve Araştırma Merkezi (AMATEM) biriminde yatarak takip edilen madde kullanım bozukluğu tanılı hastaların hepatit B virüsü (HBV) yüzey antijeni (HBsAg), HBV yüzey antikoru (anti-HBs), hepatit C virüsü (HCV) antikoru (anti-HCV) ve insan bağışıklık yetmezliği virüsü (HIV) antikoru (anti-HIV) durumlarının değerlendirilmesi ve ilişkili faktörlerin incelenmesi amaçlanmıştır.

Yöntem: Bu geriye dönük ve kesitsel çalışmada, 2020 yılı içerisinde AMATEM servisine yatışı yapılmış bütün hastaların verileri incelendi. Hastalara ait idrarda madde, kanda etil alkol ve seroloji tetkikleri kaydedildi.

Bulgular: Yıl içerisinde AMATEM'e yatışı yapılan 240 erkek hastaya ait veriler incelendi. Hastaların ortalama yaşı 31,57±9,37 yıldı. En sık saptanan tanılar çoklu madde kullanım bozukluğu (%33,77), eroin kullanım bozukluğu (%25) ve esrar kullanım bozukluğuydu (%18,75). İdrarda en sık pozitif saptanan maddeler metamfetamin (%41,66), eroin (%41,66) ve esrardı (%23,33). Çoklu madde kullanım bozukluğu (n=81) tanılı hastaların 42'sinde eroin ve metamfetamin birlikte pozitifti. Serolojik tetkiklerde 5 (%2,08) hastada HBsAg, 6 (%2,5) hastada anti-HCV, 141 (%58,75) hastada da anti-HBs pozitif saptanırken, anti-HIV'in pozitif saptandığı hasta yoktu. Anti-HCV pozitifliği saptanan hastaların tamamında eroin pozitifti. Anti-HBs pozitif (n=141; 29,04±7,45) saptanan hastalarla negatif (n=99; 35,16±10,62 yıl) saptanan hastalar arasında ortalama yaş açısından anlamlı farklılık saptandı (p<0,001).

Sonuç: Bu çalışma bir AMATEM servisinde yatan hastaların madde kullanım özelliklerini ve seroloji bulgularını bildirmektedir. Viral hepatit bulguları anlamlı saptanan madde kullanıcılarının ilgili tıp bölümlerine yönlendirilmesi, enfeksiyon bulaşmalarının önüne geçmede önemli bir yöntemdir.

Anahtar Sözcükler: Madde kötüye kullanımı, viral hepatit, hepatit B, hepatit C, HIV.

Investigation of Anti-HBs, HBsAg, Anti-HCV, and Anti-HIV Seroprevalence and Related Factors in AMATEM Inpatients: Data for 2020

Abstract

Aim: The relationship between substance use and the frequency of viral hepatitis has been reported in various studies. It is known that the characteristics of substance use change over time and show regional differences. There is a lack of studies examining viral hepatitis markers in individuals with substance use disorder in Türkiye. In this study, it was aimed to evaluate the hepatitis B virus (HBV) surface antigen (HBsAg), HBV surface antibody (anti-HBs), hepatitis C virus (HCV) antibody (anti-HCV) and human immunodeficiency virus (HIV) antibody (anti-HIV) status of patients diagnosed with substance use disorder

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and to examine related factors in the Alcohol and Drug Addiction Treatment and Research Center (AMATEM) unit of a mental health and diseases hospital.

Method: In this retrospective and cross-sectional study, the data of all patients admitted to the AMATEM inpatient unit in the year 2020 were analyzed. Urine toxicology, blood ethyl alcohol levels, and serological test results were recorded.

Results: The data of 240 male patients admitted to AMATEM during the year were analyzed. The mean age of the patients was 31.57±9.37 years. The most common diagnoses were multiple substance use disorder (33.77%), heroin use disorder (25%), and cannabis use disorder (18.75%). The most frequently positive substances in urine were methamphetamine (41.66%), heroin (41.66%) and cannabis (23.33%). Heroin and methamphetamine were positive together in 42 of the patients diagnosed with multiple substance use disorder (n=81). In serological examinations, HBsAg was positive in 5 (2.08%) patients, anti-HCV was positive in 6 (2.5%) patients, and anti-HBs was positive in 141 (58.75%) patients, and no patient tested positive for anti-HIV. All of the patients with anti-HCV positivity were heroin positive. There was a significant difference in mean age between patients who were found to be anti-HBs positive (n=141, 29.04±7.45) and those who were negative (n=99, 35.16±10.62 years) (p<0.001).

Conclusion: This study reports the substance use characteristics and serology findings of patients hospitalized in an AMATEM inpatient unit. Referring patients with significant viral hepatitis findings to relevant medical departments is essential for preventing the transmission of infections.

Keywords: Substance abuse, viral hepatitis, hepatitis B, hepatitis C, HIV.

Giriş

Tüm dünyada en yaygın üç kronik viral enfeksiyon olan hepatit B virüsü (HBV), hepatit C virüsü (HCV) ve insan bağışıklık yetmezliği virüsü (HIV) cinsel, kan ve damar içi madde kullanımı gibi benzer yollarla bulaşır[1]. Dünya Sağlık Örgütü'nün 2017 yılında yayınladığı HBV ve HCV testine ilişkin ilkeler raporuna göre dünya çapında 248 milyon insan kronik HBV enfeksiyonu[2], 80 milyon insan kronik HCV enfeksiyonu ile birlikte yaşarken, 110 milyon insanda HCV antikoru (anti-HCV) pozitiftir[3]. Mevcut kronik HBV hastalarının çoğu HBV aşısı bulunmadan veya bebeklikte yaygın olarak kullanılmadan önce doğmuş kişilerdir. Küresel olarak HBV aşısının yaygın bir şekilde kullanılmaya başlanması yeni kronik HBV enfeksiyonu insidansını önemli derecede azaltmıştır[4]. Bebeklik döneminde üç doz HBV aşısının tüm dünyada tamamlanma oranının %84'e ulaşması, aşı öncesi dönem olan 1980-2000 yıllarından 2015 yılına kadar HBV prevalansının %4,7'den %1,3'e kadar düşmesini sağlamıştır. Yeni ortaya çıkan HCV enfeksiyonlarının en sık görülen nedenleri, güvenli olmayan sağlık bakımı prosedürleri ve damar içi madde kullanımı olarak bildirilmektedir[5].

Tüm dünyada yaygın bir sorun olan madde kullanımı oranları giderek artmakta ve sosyal, ekonomik ve sağlıkla ilgili ciddi sorunlara neden olmaktadır[6]. Viral enfeksiyonlar madde kullanımıyla ilişkili en ciddi komplikasyonlardır. Maddenin kendisi, hazırlanmasında veya alınmasında kullanılan araçlar enfeksiyon etkenleri ile sıklıkla kontamine olabilir. Birden fazla kişi tarafından kullanılan enjektörü kullanmak, enjektöre temiz olmayan elle dokunmak ve maddeyi almadan önce cildin temizlenmesine özen göstermemek de viral enfeksiyon bulaşına neden olabilir. Damar içi uygulanan maddelerin kullanımı sırasında viral hepatit bulaşması nispeten sıktır. Kullanılan maddeye tolerans gelişmesi aynı maddenin damar içi kullanımına en sık neden olan faktördür. Ayrıca aşerme şiddetinin yüksek olması, dürtüsellik ve kişinin kendisi üzerindeki kontrolünü yitirmiş olması madde etkisinin hızlı elde edilmesi arzusuna yol

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açar. Çünkü enjeksiyon yoluyla kullanılan madde hızlı ve güçlü bir etki göstermektedir[7]. Başta damar içi uygulamalar olmak üzere madde kullanımlarının neden olduğu viral enfeksiyonların sıklığı ve özellikleri bölgesel, toplumsal ve zamansal değişiklikler göstermektedir[1]. Zhou ve ark.[1]'ın 2009 yılında gerçekleştirdiği çalışmaya göre damar içi madde kullanımı olan Çinlilerde HCV enfeksiyonu oranı %69, HBV enfeksiyonu oranı %51,6 ve HIV enfeksiyonu oranı %33,7 iken aynı bölgede yaşayan Burmalılarda HCV enfeksiyonu oranı %48,1, HBV enfeksiyonu oranı %43,1 ve HIV enfeksiyonu oranı %27 olarak saptanmıştır. Ayrıca HIV-HBV ko-enfeksiyonu, HIV-HCV ko-enfeksiyonu ve HIV-HBV-HCV üçlü enfeksiyonu Çinlilerde Burmalılara göre anlamlı olarak daha yüksek saptanmıştır.

Seroprevalans, bir popülasyonda seroloji numunelerine dayalı olarak belirli bir hastalık için testleri pozitif saptanan kişilerin sayısıdır[8]. Ülkemizde madde kullanıcılarında gerçekleştirilen seroprevalans çalışmalarının sayısı yetersizdir. Yüncü ve ark.[9] İzmir'de bir bağımlılık servisinde 2004-2007 yılları arasında takip ve tedavi edilen çocuk ve ergen hastaların hepatit B ile ilişkili verilerini incelemiş ve serolojik sonuçlarına ulaşılan hastaların %14,89'unun HBV yüzey antikorunun (anti-HBs), %9,04'ünün HBV core antikorunun (anti-HBc) pozitif olduğunu saptamıştır. Aktan-Mutlu ve ark.[10] 2010-2011 yılları arasında Van'da bir psikiyatri kliniğinde yatarak tedavi edilen 15-25 yaşları arasındaki damar içi madde kullanım öyküsü bulunmayan hastaların HBV, HCV, HIV ve sifiliz (veneral diseases research laboratory, VDRL) parametrelerini incelemiş ve serolojik olarak sadece eroin kullanan %1,8 hastanın HBV yüzey antijeni (HBsAg) açısından ve eroin kullanan %1,8 hastanın da anti-HCV açısından pozitif olduğunu; HIV antikoru (anti-HIV) ve VDRL pozitifliği saptanmadığını bildirmiştir. Altuğlu ve ark.[8] 2013-2017 yılları arasında İzmir'de bir bağımlılık polikliniğinde takip edilen madde kullanımı öyküsü olan hastaların HBsAg, anti-HCV ve anti-HIV durumlarını incelemiştir. Bu çalışmada[8], hastaların %2,2'sinde HBsAg, %0,6'sında anti-HCV, %0,2'sinde anti-HIV pozitif olarak saptanmıştır. Madde kullanım özelliklerinin zamanla değiştiği ve bölgesel farklılıklar gösterdiği düşünüldüğünde, bu çalışmaların sayısının artmasının ve farklı illerden sonuçların paylaşılmasının önemi ortaya çıkmaktadır.

Ülkemizde, madde kullanım bozukluklarının tedavisinde Alkol ve Madde Bağımlıları Tedavi ve Araştırma Merkezlerinin (AMATEM) rolü büyüktür. Ayaktan ve yatarak tedavi hizmetlerinin gerçekleştirildiği AMATEM birimleri birçok ruh sağlığı ve hastalıkları hastanesinin en önemli birimleridir. AMATEM birimine yatışı yapılan hastalarda kurumlar arasında değişiklikler görülmekle birlikte çeşitli kan ve idrar tetkikleri rutin olarak gerçekleştirilmektedir. Bu çalışmada 18 ile hizmet eden, bölgenin tek ve ülkemizin en büyük ruh sağlığı ve hastalıkları hastanelerinden biri olan XXX Ruh Sağlığı ve Hastalıkları Hastanesi'nin erkek AMATEM biriminde yatarak takip edilen madde ve alkol kullanım bozukluğu tanılı hastaların seroprevalansı ve ilişkili faktörleri geriye dönük olarak incelenmiştir. HBV'nin aşılama çalışmalarına sekonder olarak insidansında ciddi bir düşüş olduğu düşünüldüğünde çalışmadaki anti-HBS pozitifliği ile ilgili sonuçların bu bilgiyle uyumlu olacağı hipotezi ortaya çıkmaktadır. Bir diğer hipotezimiz HCV'nin damar içi madde kullanımı başta olmak üzere madde kullanımıyla olası ilişkisine sonuçlar aracılığıyla ulaşılabileceği yönündedir.

Gereç ve Yöntem

Çalışma Dizaynı

Bu geriye dönük çalışmada, 01/01/2020 – 31/12/2020 tarihleri arasında XXX Ruh Sağlığı ve Hastalıkları Hastanesi'nin erkek AMATEM biriminde yatarak takip edilen madde ve alkol kullanım bozukluğu tanılı hastaların verileri incelenmiştir. Hasta kayıt sisteminde hastalara ait medeni durum, yaş, sosyal güvence tipi ve yatış süresi gibi bilgilere ulaşılmaktadır. Hastanemizin yataklı birimlerine yatışı yapılan hastaların serolojik tetkikleri rutin olarak gerçekleştirilmektedir. Ayrıca AMATEM biriminde idrarda yasadışı madde rutin olarak bakılırken, kanda etil alkol hastanın durumuna göre bakılmaktadır. Araştırmacılar tarafından bu veriler hasta kayıt sisteminden elde edilmiştir. Herhangi bir hasta ya da hastaya ait veri çalışmadan dışlanmamıştır. Eroin ile birlikte buprenorfini de pozitif saptanan, alkol ve yasadışı maddelerle birlikte benzodiyazepini de pozitif saptanan hastalar çoklu madde olarak değerlendirilmedi. Bu çalışmada, opiat veya opioid yerine eroin terimi; kannabis, kannabinoid veya tetrahidrokannabinol yerine esrar terimi kullanılmıştır.

Bir yıllık süre içerisinde AMATEM'de takip edilen 240 olgunun tamamına ait HBsAg, anti-HCV, anti-HIV ve anti-HBs pozitiflik durumları kaydedildi. Kanda etil alkol hastaların sadece 28'inde bakılmıştı. Çalışma için Fırat Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu'ndan onay alındı (Tarih: 18/03/2021, Oturum Sayısı: 2021/04-36).

Laboratuvar Analizi

Olguların tamamında idrarda esrar (kannabinoid), metamfetamin, benzodiyazepin, buprenorfin, eroin (opiat) ve kokain incelenmişti. Bu analizlerde esas alınan minimum madde düzeyleri şu şekildeydi: Esrar (kannabinoid) için 50 µg/L, metamfetamin için 500 µg/L, benzodiyazepinler için 300 µg/L, buprenorfin için 5 µg/L, eroin (opiat) için 2000 µg/L ve kokain için 150 µg/L. Kanda etil alkol için referans aralığı 0- 50 mg/dL olarak belirlendi.

Periferik venöz kan ve idrar örnekleri Beckman Coulter AU480, Inc. (Brea, Kaliforniya, ABD) cihazıyla incelendi. İdrarda madde ve kanda etil alkol Thermo Scientific™ DRI® kitleri aracılığıyla değerlendirildi.

İstatistiksel Analiz

İstatistiksel analizlerde Windows SPSS 22.0 programı (Statistical Package for the Social Sciences Inc.) kullanıldı. Tanımlayıcı istatistikler ve yaş gibi sürekli değişkenler ortalama ± standart sapma, kategorik değişkenler ise frekans ve yüzde olarak verildi. Kategorik verilerin analizinde Ki-kare testi kullanıldı. İkiden fazla grubun karşılaştırılmasında Tek Yönlü ANOVA kullanıldı ve Post Hoc Tamhane's T2 ile olası anlamlı farklılığı oluşturan gruplar belirlendi. İstatistiksel anlamlılık düzeyi tüm değerler için $p<0,05$ olarak kabul edildi.

Bulgular

Bu çalışmada 240 erkek hastaya ait veriler incelendi. Toplamda (n=240) ortalama yaş 31,57±9,37 yıl iken (minimum 21 yıl, maksimum 70 yıl), ortalama yatış süresi 13,82±8,84 gün (minimum 1 gün, maksimum 58 gün) olarak belirlendi. Sistemde kayıtlı medeni

durumlarına göre 149 (%62,08) hasta bekâr, 80 (%33,33) hasta evli, 9 (%3,75) hasta boşanmış/dul idi ve 2 (%0,84) hastanın medeni durumu kayıtlı değildi. Hastaların 97 (%40,41)'sinin sosyal güvencesi Sosyal Güvenlik Kurumu (SGK), 127 (%52,91)'sinin Yeşil Kart, 9 (%3,75)'unun Bağkur ve 7 (%2,93)'sinin adli vaka ödemesiydi (Tablo 1).

Hastalara ait tanılar Tablo 1'de gösterilmiştir. Tanı grupları arasında ortalama yaş açısından anlamlı farklılık saptandı (p<0,001). Post Hoc analize göre alkol kullanımı olanların yaşı ile esrar (p=0,001), eroin (p<0,001), metamfetamin (p<0,001), çoklu madde (p<0,001) kullanımı olanların yaşı arasında anlamlı farklılık saptanırken, esrar, eroin, metamfetamin ve çoklu madde kullanımı olanların yaşları benzerdi (p>0,05). Alkol kullanım bozukluğu olan hastalarda ortalama yaş madde kullanım bozukluğu tanılarına daha yüksekti.

İdrarda madde analizi sonuçları Tablo 1'de gösterilmiştir. Kan tetkiklerinde etil alkol pozitif olarak saptanan 4 hasta vardı. Etil alkol pozitif olarak saptanan hastaların 3'ü alkol kullanım bozukluğu tanılıyken, 1'i çoklu madde kullanım bozukluğu tanılıydı.

Çoklu madde kullanım bozukluğu tanılı hastaların 42'sinde eroin ve metamfetamin; 19'unda esrar ve metamfetamin; 9'unda esrar ve eroin; 8'inde esrar, metamfetamin ve eroin; 1'inde esrar ve alkol; 1'inde esrar ve kokain; 1'inde de esrar ve buprenorfin birlikte pozitif saptandı.

Serolojik tetkik sonuçları Tablo 1'de gösterilmiştir. Anti-HCV pozitifliği saptanan hastaların 5'inde tanı eroin kullanım bozukluğuydu. Anti-HCV pozitifliği saptanan altıncı hastada eroin kullanımına ek olarak esrar ve metamfetamin de pozitif olarak saptandı.

Anti-HBs pozitif (n=141, 29,04±7,45) saptanan hastalarla negatif (n=99, 35,16±10,62 yıl) saptanan hastalar arasında ortalama yaş açısından anlamlı farklılık saptandı (p<0,001).

Hastanemizin erkek AMATEM biriminde 2018 yılında yaklaşık olarak 530, 2019 yılında 500, 2020 yılında 240, 2021 yılında 380, 2022 yılında 450 hasta yatarak takip ve tedavi edilmiştir.

Tablo 1. Tanı gruplarına göre sosyodemografik ve klinik veriler

Değişkenler		Tanı							p
		Esrar (n=45) Ort±SS n (%)	Eroin (n=60) Ort±SS n (%)	Metamfetamin (n=33) Ort±SS n (%)	Alkol (n=19) Ort±SS n (%)	Kokain (n=1) Ort±SS n (%)	Sedatif (n=1) Ort±S S n (%)	Çoklu Madde (n=81) Ort±SS n (%)	
Yaş (yıl)		31±8,6	29,8±8,6	29,6±6,17	45,3±12,7	40,00	30,00	30,7±8,1	<0,001**
Yatış Süresi (gün)		12,7±10,4	15,3±8,6	13,75±8,05	17,05±9,4	22,00	2,00	12,7±8,0	0,181
Medeni Durum	Evli	17 (%37,8)	13 (%21,7)	12 (%36,4)	11 (%57,9)	1 (%100)	-	26 (%32,1)	0,045*
	Bekâr	27 (%60,0)	47 (%78,3)	18 (%54,5)	5 (%26,3)	-	1 (%100)	51 (%63,0)	
	Boşanmış/Dul	1 (%2,2)	-	2 (%6,1)	2 (%10,5)	-	-	4 (%4,9)	
	Belirtilmemiş	-	-	1 (%3,0)	1 (%5,3)	-	-	-	

Sağlık Güvencesi	SGK	20 (%44,4)	19 (%31,7)	18 (%54,5)	11 (%57,9)	1 (%100)	-	28 (%34,6)	0,363
	Yeşil Kart	24 (%53,3)	38 (%63,3)	15 (%45,5)	6 (%31,6)		1 (%100)	43 (%53,1)	
	Adli	-	1 (%1,7)	-	1 (%5,3)	-	-	5 (%6,2)	
	Bağkur	1 (%2,2)	2 (%3,3)	-	1 (%5,3)	-	-	5 (%6,2)	
İdrar Sonuçları (n=Pozitif / Negatif)	Esrar	16 / 29	0 / 60	0 / 33	0 / 19	0 / 1	0 / 1	40 / 41	<0,001**
	Eroin	0 / 45	41 / 19	0 / 33	0 / 19	0 / 1	0 / 1	59 / 22	<0,001**
	Metamfetamin	0 / 45	0 / 60	31 / 2	0 / 19	0 / 1	0 / 1	69 / 12	<0,001**
	Benzodiyazepin	4 / 41	4 / 56	4 / 29	3 / 16	0 / 1	1 / 0	4 / 77	0,024*
	Kokain	0 / 45	0 / 60	0 / 33	0 / 19	1 / 0	0 / 1	1 / 80	<0,001**
	Buprenorfin	0 / 45	12 / 48	0 / 33	0 / 19	0 / 1	0 / 1	7 / 74	0,002*
Seroloji (n=Pozitif / Negatif)	HBsAg	2 / 43	1 / 59	1 / 32	0 / 19	0 / 1	0 / 1	1 / 80	0,905
	Anti-HCV	0 / 45	5 / 55	0 / 33	0 / 19	0 / 1	0 / 1	1 / 80	0,076
	Anti-HIV	0 / 45	0 / 60	0 / 33	0 / 19	0 / 1	0 / 1	0 / 81	1,000
	Anti-HBs	19 / 26	18 / 42	17 / 16	15 / 4	0 / 1	0 / 1	30 / 51	0,007*

*p<0,05; **p<0,001; İstatistiksel analizde Ki-Kare analizi ve Tek Yönlü ANOVA kullanıldı; Kısaltmalar = Ort: Ortalama; SS: Standart Sapma

Tartışma

Bu çalışmada, bir ruh sağlığı ve hastalıkları hastanesinin yataklı erkek AMATEM biriminde 2020 yılı içerisinde takip edilen hastaların serolojik tetkikleri ve bu tetkiklerin madde kullanımları ile ilişkisi geriye dönük olarak incelenmiş ve çeşitli anlamlı bulgulara ulaşılmıştır. İlk dikkat çeken bulgu 2019 yılındaki yatan hasta sayısının 2020 yılında yarıya düşmesi ve 2021 yılından sonra yavaş yavaş artış göstermesidir. Bu sayısal farklılıkların koronavirüs hastalığı (COVID-19)'nın etkilerinden kaynaklandığı düşünülmektedir. Dünyada 2019'un son aylarında görülen ve ülkemizde 11 Mart 2020'de ilk vakanın bildirildiği COVID-19, sağlık sistemlerinde büyük çaplı önlemlerin alınmasına neden olmuştur[11]. Bu önlemler kapsamında Nisan 2020 ve sonrasındaki yaklaşık üç ay boyunca hastanemizde AMATEM birimine yeni yatış yapılmamıştır. Yatış yapılmaya başlandıktan sonra da yarı kapasiteli olarak hizmet vermiştir. Bu sebeplerle 2020 yılındaki yatış sayısı önceki yıllara göre oldukça düşük kalmıştır. Düşük hasta sayıları 2021'de bir miktar artsa da 2022 yılında bile 2019 yılı sayılarına ulaşılamamıştır. Diğer taraftan hasta sayılarına etki eden başka faktörlerin de olabileceği unutulmamalıdır.

Çalışmadaki hastalarda ortalama yaş literatürdeki ulusal ve uluslararası çalışmaların bulgularıyla benzer bulunmuştur. Ülkemizdeki AMATEM birimlerinde gerçekleştirilen çalışmalarda madde kullanıcılarında ortalama yaş 33,6 – 45,42 yıl arasında bildirilmiştir[12]. Karabulut ve ark.[13] damar yoluyla madde kullananlarda ortalama yaşı 30,9 ± 6,6 yıl olarak, Zhou ve ark.[1] ise 32,36 ± 8,8 yıl olarak bildirmiştir. Tanı gruplarına göre hastaların medeni durumları arasında anlamlı bir farklılık bulunmaktadır. Ancak, hasta kayıt sisteminde yer alan medeni durum, hastaların medeni durumlarını sadece

resmi olarak değerlendirmemizi sağlamaktadır. Veriler geriye dönük olduğu için bu kişilerin evliyseler bile eşleriyle birlikte yaşayıp yaşamadıkları, ya da ne kadar süredir birlikte ya da ayrı oldukları gibi bilgilere ulaşmamız mümkün değildir. Bu açıdan düşünüldüğünde medeni durumdan yola çıkarak hastaların madde kullanım özellikleri hakkında yorum yapmak sağlıklı olmayacaktır. Hastaların sosyal güvenceleri ile madde kullanım özellikleri ve seroloji parametreleri arasında anlamlı ilişki saptanmamıştır. Yazıda bu veriye ilerleyen dönemlerde başka araştırmacılar tarafından kullanılabilmesi amacıyla yer verilmiştir.

Madde kullanım özellikleri açısından hastalar incelendiğinde hastaların büyük çoğunluğunun çoklu madde kullandığı, çoklu madde kullanan hastaların 69'unda metamfetaminin pozitif saptandığı, metamfetamin kullanım bozukluğu tanılı 33 hastayla birlikte toplamda 102 hastanın metamfetamin ile o dönemde aktif ilişkisi olduğu görülmektedir. Hastalarda, ikinci sırada eroin kullanım bozukluğunun geldiği, çoklu madde kullanan hastaların 59'unda eroinin pozitif saptandığı, eroin kullanım bozukluğu tanılı 60 hastayla birlikte toplamda 119 hastanın eroin ile o dönemde aktif ilişkisi olduğu görülmektedir. Tanılar arasında üçüncü sırada da esrar kullanım bozukluğunun geldiği görülmektedir. Çoklu madde kullanan hastaların 39'unda esrarın pozitif saptandığı, esrar kullanım bozukluğu tanılı 45 hastayla birlikte toplamda 84 hastanın esrar ile o dönemde aktif ilişkisi olduğu görülmektedir.

Yüncü ve ark.[9]'ın ortalama yaşı 16,4 ± 1,4 yıl olan hastalarda gerçekleştirdiği çalışmada, hastaların %69,1'inde esrar, %56,4'ünde uçucu maddeler, %46,8'inde ekstazi saptanmıştır. Aktan-Mutlu ve ark.[10], hastaların %67,3'ünün eroini, %12,7'sinin esrarı, %5,5'inin uçucu maddeleri ve %5,5'inin de çoklu madde kullanımını tercih ettiğini bildirmiştir. Madde kullanım tercihlerinin zamanla değiştiği ve bölgesel değişiklikler gösterdiği bilinmektedir. Türkiye Uyuşturucu Raporu[14]'nun 2021 yılı verilerine bakıldığında bizim çalışmamızdaki bulgularla benzer şekilde metamfetamin kullanımının yaygınlaştığı görülmektedir. Bu rapora göre 2020 yılı eroin olay sayısında, 2019 yılına göre %7,46 oranında; esrar olay sayısında 2019 yılına göre %17,9'luk bir düşüş saptanırken, 2020 yılında metamfetamin olay sayısı, bir önceki yıla oranla %47,7'lik artış göstermiştir.

Madde kullanımı ile viral enfeksiyon prevalansı arasında anlamlı bir ilişki bulunmaktadır. HCV başta olmak üzere HBV ve HIV gibi çeşitli viral enfeksiyonların özellikle damar içi madde kullanıcılarında daha yüksek olarak saptandığı bildirilmiştir[1,13]. Bu çalışmada da tek başına ya da başka bir maddeyle birlikte eroin kullanımı olan hastaların %2,5'inde anti-HCV pozitif saptanmıştır. Çalışma, geriye dönük olduğu için bu hastaların eroini damar içi uygulama ile alıp almadıkları bilinmemekle birlikte, damar yoluyla en sık kullanılan yasadışı madde olan eroin kullanan bu hastaların HCV ile bu yolla karşılaşmış olmaları olasılık dâhilindedir. Madde kullanıcılarında kronik HCV oranı madde kullanım özellikleri, zaman dilimi, yaşam ortamı ve uluslararası yasa dışı madde rotaları gibi birçok faktöre bağlı olarak değişiklik göstermektedir. Altuğlu ve ark.[8] çalışmasında hastaların %2,2'sinde HBsAg, %0,6'sında anti-HCV ve %0,2'sinde anti-HIV'i pozitif olarak saptarken, anti-HBs durumları incelenmemiştir. Aktan-Mutlu ve ark.[10] damar içi madde kullanım öyküsü olmayan hastaların %1,8'inde HBsAg'yi pozitif, %1,9'unda anti-HCV'yi pozitif saptarken

hastaların hiçbirinde anti-HIV pozitif saptanmamıştır. Ancak çalışmalarında hastaların anti-HBs durumları incelenmemiştir. Bulguların bu çalışmalarla benzerlikler gösterdiği görülmektedir. Bu çalışmada Altuğlu ve ark.[8] ve Aktan-Mutlu ve ark.[10]'ın çalışmalarından farklı olarak hastaların anti-HBs durumları da incelenmiş ve yaşı küçük olan hastalarda anti-HBs'nin pozitif olduğu görülürken nispeten ileri yaştaki hastalarda anti-HBs negatif olarak saptanmıştır. Bu durum ilk bakışta madde kullanım özellikleri ile ilişkilendirilebilecek bir bulgu gibi görünse de asıl neden HBV aşısının aşı takvimine eklenme tarihiyle ilgilidir[4]. DSÖ'nün önerisiyle 1991 yılından itibaren öncelikle HBV taşıyıcılığının yüksek olduğu yerlerde yeni doğan bebeklerin HBV'den korunması için aşılama uygulamasına geçilmiş ve bu uygulama 1997 yılından itibaren tüm dünyada HBV oranına bakılmaksızın bütün yeni doğan bebeklerin HBV için aşılanması şeklinde yaygınlaştırılmıştır. Ülkemizde HBV aşısı 1997 yılında rutin aşılama programına alınmış ve 1998 yılının Ağustos ayında uygulanmaya başlanmıştır. Bu tarihten sonra doğan çocuklarda anti-HBs pozitifliğinin daha önce doğan yani nispeten yaşı ileri olanlara göre daha yüksek olması beklenen bir durumdur[15].

Bu çalışma geriye dönük doğasından kaynaklanan kısıtlılıklar içermektedir. Bu çalışmadaki idrarda taranan maddelerin yanlış pozitiflik ya da yanlış negatiflik durumları bilinmemektedir. Çalışmanın gerçekleştirildiği hastanede taranan madde sayısı kısıtlıdır. Bu nedenle bu çalışmaya dâhil edilen hastaların kullanmış oldukları olası diğer maddeler bilinmemektedir. Ayrıca bu çalışmada madde kullanımları kesitsel olarak incelenmiştir. Oysa bu hastaların ilgili dönemlerde başka maddeleri de kullanıyor olmaları mümkündür. Pozitif olarak saptanan maddelerin hangi yolla kullanıldıkları bilinmemektedir. Serolojik belirteçlerin yanlış pozitiflik ya da yanlış negatiflik durumları belli değildir. Pozitif seroloji bulgularının ne zaman ortaya çıktığı bilinmemektedir.

Sonuç

Bu çalışma, HBV, HCV ve HIV gibi viral enfeksiyonların bir AMATEM biriminde takip edilen hastalardaki sıklığını göstermektedir. Madde kullanıcıları gibi viral enfeksiyonlara yakalanma, bu viral enfeksiyonları başka madde kullanıcılarına ve madde kullanıcısı olmayan eş, partner gibi kişilere aktarma riski yüksek olan gruplarda erken tanı önemlidir. Tanı alan hastaların enfeksiyon hastalıkları birimlerine yönlendirilmesi bu hastaların hastalıklarını tanımasını, tedavi süreçlerini yönlendirmesini ve başkalarına bulaşı engellemesini kolaylaştıracaktır. Çalışmamız, tüm dünyada uygulanan HBV aşılama programının etkinliğini göstermesi açısından da önemlidir.

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Determination of Intercultural Sensitivity and Empathic Tendency Levels of International Nursing Students

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Abstract

Aim: This study aimed to determine the intercultural sensitivity and empathic tendencies of international nursing students.

Method: This was a descriptive and cross-sectional study, and the sample consisted of 89 students from the nursing department of a university. The data collection tools used were the participants' personal information form, the Intercultural Sensitivity Scale, and the Multidimensional Emotional Empathy Scale. Data were collected between November 25, 2023, and November 30, 2024.

Results: The study participants had a mean Intercultural Sensitivity Scale and Multidimensional Emotional Empathy Scale score of 89.83±12.39 and 110.70±13.46, respectively. There was a positive correlation between intercultural sensitivity and multidimensional emotional empathy scale scores ($p<.001$).

Conclusion: This study showed that empathy skills play an important role in intercultural interactions and support students in communicating effectively with different cultures. Therefore, it is important to develop programs that focus on empathy and cultural awareness in nursing education.

Keywords: International students, intercultural sensitivity, empathic tendency, nursing students.

Uluslararası Hemşirelik Öğrencilerinin Kültürlerarası Duyarlılık ve Empatik Eğilim Düzeylerinin Belirlenmesi

Öz

Amaç: Araştırmanın amacı, uluslararası hemşirelik öğrencilerinin kültürlerarası duyarlılık ve empatik eğilim düzeylerini belirlemektir.

Yöntem: Araştırma tanımlayıcı ve kesitsel bir çalışma olup, örneklemini bir üniversitenin hemşirelik bölümünde okuyan 89 öğrenci oluşturmuştur. Veri toplama araçları olarak katılımcıların kişisel bilgi formu, Kültürlerarası Duyarlılık Ölçeği ve Çok Boyutlu Duygusal Empati Ölçeği kullanılmıştır. Veriler, 25 Kasım 2023 ile 30 Kasım 2024 tarihleri arasında toplanmıştır.

Bulgular: Çalışma katılımcılarının ortalama Kültürlerarası Duyarlılık Ölçeği ve Çok Boyutlu Duygusal Empati Ölçeği puanı sırasıyla 89,83±12,39 ve 110,70±13,46'ydı. Kültürlerarası Duyarlılık Ölçeği ve Çok Boyutlu Duygusal Empati Ölçeği puanları arasında pozitif bir korelasyon vardı ($p<0,001$).

Sonuç: Bu çalışma, empati becerilerinin kültürlerarası etkileşimlerde önemli bir rol oynadığını ve öğrencilerin farklı kültürlerle etkili iletişim kurmasını desteklediğini göstermektedir. Hemşirelik eğitiminde, empati ve kültürel farkındalık odaklı programların geliştirilmesi önemlidir.

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Anahtar Sözcükler: Uluslararası öğrenciler, kültürlerarası duyarlılık, empatik eğilim, hemşirelik öğrencileri.

Introduction

Individuals studying in different countries are defined as international students and their numbers are increasing[1]. In recent years, the number of international students in the Turkish higher education system has significantly increased. While there were 16,656 international students in the 2000/01 academic year, this number exceeded 300,000 by 2022, demonstrating remarkable growth[2]. These students, who are educated in different cultural environments, face sociological and psychological difficulties owing to cultural interactions. International students experience adaptation problems due to cultural differences in many areas such as language, clothing, nutrition, social activities, and interpersonal relationships. Cultural adaptation is directly related to the similarity of the environment students come from to their own culture; as similarity increases, adaptation problems decrease, and as differences increase, adaptation difficulties deepen[3,4]. Cultural adaptation affects not only daily life but also individuals' health perceptions and behaviors. While culture shapes the values, beliefs, attitudes, and traditions of society, it also affects individuals' health and disease perceptions and treatment approaches[5]. In this context, health needs are shaped and changed by cultural structures at individual, family and community levels[6]. The impact of cultural differences is of great importance, particularly for health services. Nurses should show sensitivity to each individual, taking into account cultural differences and similarities, to improve the quality of care[7]. Intercultural sensitivity refers to the ability to accept individuals' cultural differences and similarities without judgment[8]. Nurses play an important role in providing care to individuals of different ethnic backgrounds in multicultural societies[9]. As future nurses, nursing students must provide effective health assessments and appropriate treatment to individuals from different cultures by embracing cultural sensitivity in their professional practice[10]. Cultural sensitivity is a fundamental competency that nursing graduates should possess in their professional practice[11], but studies have found that nursing students experience difficulties when providing care to individuals with different beliefs, communication styles and lifestyles[12,13]. Therefore, empathy plays an important role in developing cultural sensitivity. Nurses should develop empathy to effectively communicate with individuals from different cultures[14]. Individuals with a high empathic tendency also have high levels of intercultural sensitivity[15]. A culturally competent empathic approach increases satisfaction by improving quality of care, improving health outcomes, and reducing stress and burnout[16]. Cultural sensitivity in healthcare is the foundation of effective and humane care[17]. Determining nursing students' levels of cultural sensitivity and empathy is crucial for improving care quality. Understanding cultural beliefs and adapting perspectives help prevent communication issues and treatment noncompliance. Intercultural sensitivity and empathy enable healthcare professionals to deliver more effective, individualized care. Research on these skills among international students offers valuable insights for enhancing global healthcare services. The research questions were as follows:

1. What are the levels of intercultural sensitivity of international nursing students?

2. What are the levels of empathic tendencies of international nursing students?

3. Is there a relationship between levels of intercultural sensitivity and empathic tendency among international nursing students?

Material and Methods

Study Design

The research is a descriptive and cross-sectional study.

Sample of the Research

A total of in universe of the study consisted of 127 international nursing students studying in the nursing department of a university. No sample selection was made, and the aim was to reach the entire study population between November 25, 2023, and November 30, 2024. 89 students who volunteered to participate in the study constituted the sample of the study. 70.07% of the universe was reached.

Data Collection Method

Face-to-face surveys were administered in classrooms between November 25, 2023, and November 30, 2024, with participation based on voluntariness.

Data Collection Instruments

The Personal Information Form

The personal information form consisted of descriptive items[9,18] (age, gender, grade level, family type, place of birth, choosing nursing department willingly, taking lessons from below).

Intercultural Sensitivity Scale

The 24-question scale was developed by Chen ve Starosta in 2000[19] and its Turkish validity and reliability were assessed by Bulduk et al.[20]. The scale has 5 sub-dimensions. The dimension of responsibility in communication consists of items 1, 11, 13, 21, 22, 23 and 24; the dimension of respect for cultural differences consists of items 2, 7, 8, 16, 18 and 20; the dimension of self-confidence in communication consists of items 3, 4, 5, 6 and 10; the dimension of liking communication consists of items 9, 12 and 15; and the dimension of being careful in communication consists of items 14, 17 and 19. Items 2, 4, 7, 9, 12, 15, 18, 20 and 22 are coded as reverse. The scale uses a 5-point Likert-type rating scale. A high score indicates that the individual has high intercultural sensitivity, while a low score indicates that the individual has low intercultural sensitivity. The Cronbach's alpha for this study was 0.855.

Multi-Dimensional Emotional Empathy Scale

The scale was developed by Caruso and Mayer in 1998[21], and its Turkish validity and reliability were assessed by Turan et al[22]. The scale consists of 30 questions. The scale is designed on a 5-point Likert scale with a minimum score of 30 and a maximum score of 150. The scale consists of six sub-dimensions: suffering, positive sharing, responsive crying, emotional attention, feeling toward others, and emotional contagion. The Cronbach's alpha for this study was 0.806.

Study Variables

Mean scores on the Intercultural Sensitivity Scale and the Multi-Dimensional Emotional Empathy Scale served as the study's dependent variables. The independent variable in the study was personal characteristics of the participants (age, gender, grade year, family type, place of birth, choosing nursing department willingly, and taking lessons from below).

Data Analysis

The data obtained in the study were analyzed using SPSS for Windows v.25.0 at a significance level of $p<.05$. The Shapiro-Wilk test was used for normality testing. Percentages and frequencies were used as nominal variables. Arithmetic means, standard deviations and min-max were used as ordinal variables. The correlation between variables was assessed using Pearson correlation analyses.

Ethical Considerations

Ethics committee approval was obtained from the XX University Ethics Committee Presidency with the decision dated 30.10.2024 and numbered 2024-15-70 to conduct the research. The participants to be included in the study were informed before the survey and a consent form was signed.

Results

The mean age of the international nursing students was 25.56±2.73, 75.3% were male (n=67), 45% were in the fourth grade (n=40), 60.7% lived in a nuclear family (n=54), 85.4% were born in the city (n=76), 95.5% did not choose the nursing department willingly (n=85), and 64% did not take lessons from below (n=57) (Table 1).

Table 1. Personal characteristics of international nursing students (n=89)

		Mean±SD	
Age		(25.56±2.73) (min:18-max:33)	
		n	**%**
Gender	**Female**	22	24.7
	Male	67	75.3
Grade level	**2nd grade**	19	21.3
	3rd grade	30	33.7
	4th grade	40	45.0
Family type	**Nuclear family**	54	60.7
	Extended family	34	38.2
	Broken family	1	1.1
Place of birth	**Village**	2	2.2
	County	11	12.4
	Town	76	85.4
The status of choosing the nursing department willingly	**Yes**	4	4.5
	No	85	95.5
Taking lessons from below	**Yes**	32	36.0
	No	57	64.0

SD: Standard deviation

In Table 2, the international nursing students participating in the study had a total Intercultural Sensitivity Scale mean score of 89.83±12.39, and their sub-dimensions mean scores were; Interaction Engagement 25.60±3.93, Respect for Cultural Differences 23.41±4.32, Interaction Confidence 17.89±3.66, Interaction Enjoyment 11.14±2.31, Interaction Attentiveness 11.76±2.45. The students' total Multidimensional Emotional Empathy Scale mean score was 110.70±13.46, and their sub-dimensions mean scores were; Suffering was found to be 33.49±6.12, Positive Sharing 21.32±3.30, Responsive Crying 9.47±2.16, Emotional Attention 11.34±2.84, Feel for Others 13.49±2.34, Emotional Contagion 6.68±2.03.

Table 2. Distribution of mean scores of the Intercultural Sensitivity Scale, the Multi-dimensional Emotional Empathy Scale, and sub-dimensions (n=89)

Measure	Mean (N=89)	Standard Deviation	Minimum	Maximum
Intercultural Sensitivity Scale	89.83	12.39	59.00	111.00
Interaction Engagement	25.60	3.93	12.00	33.00
Respect for Cultural Differences	23.41	4.32	14.00	30.00
Interaction Confidence	17.89	3.66	8.00	25.00
Interaction Enjoyment	11.14	2.31	3.00	15.00
Interaction Attentiveness	11.76	2.45	11.76	2.45
Multi-dimensional Emotional Empathy Scale	110.70	13.46	66.00	144.00
Suffering	33.49	6.12	10.00	40.00
Positive Sharing	21.32	3.30	11.00	25.00
Responsive Crying	9.47	2.16	5.00	15.00
Emotional Attention	11.34	2.84	4.00	18.00
Feel for Others	13.49	2.34	8.00	19.00
Emotional Contagion	6.68	2.03	2.00	10.00

As a result of the correlation analysis conducted to determine the relationship between the scales in Table 3, a weak positive correlation[23] was found between the total score of the multidimensional emotional empathy scale and interaction engagement (r=.431, p<.001), Respect for Cultural Differences (r=.315, p<.001), Interaction Confidence (r=.354 p<.001), Interaction Enjoyment (r=.295, p<.001), Interaction Attentiveness (r=.405 p<.001), and Intercultural Sensitivity Scale total score (r=.485 p<.001). A positive correlation was found between the total score on the Intercultural Differences Scale and Suffering (r=.465, p<.001), Positive Sharing (r=.465, p<.001), Feel for Others (r=.267, p<.05), and Emotional Contagion (r=.209, p<.05). Accordingly, as the empathic skill levels of international nursing students increase, their intercultural sensitivity levels also increase.

Table 3. The relationship between the mean scores of the Multi-dimensional Emotional Empathy Scale, the Intercultural Sensitivity Scale and their sub-dimensions (n=89)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	**Multidimensional Emotional Empathy Scale**	1												
2	Suffering	.830**	1											
3	Positive Sharing	.677**	.453**	1										
4	Responsive Crying	.486**	.242*	.181**	1									
5	Emotional Attention	.147	-.037	-.155	.010*	1								
6	Feel for Others	.597**	.376**	.365**	.379**	-.118	1							
7	Emotional Contagion	.511**	.194	.485**	.202	.031	.325**	1						
8	**Intercultural Sensitivity Scale**	.485**	.465**	.465**	.178	-.175	.267*	.209*	1					
9	Interaction Engagement	.431**	.351**	.423**	.179	-.115	.310**	.240*	.834**	1				
10	Respect for Cultural Differences	.315**	.327**	.282**	.091	-.105	.070*	.126	.835**	.584**	1			
11	Interaction Confidence	.354**	.206	.363**	.274**	-.033	.221*	.208	.756**	.587**	.514**	1		
12	Interaction Enjoyment	.295**	.459**	.289**	-.015	-.325**	.179*	.026	.658**	.352**	.560**	.327**	1	
13	Interaction Attentiveness	.405**	.470**	.363**	.061	-.149	.234*	.116	.485**	.376**	.205	.161	.300**	1

* p<.05,**p<.00

Discussion

Healthcare education providers face rapidly changing conditions in a globalized world, including aging populations, income disparities, mass migration, and challenges in nursing that demand global solutions[24]. The number of nursing students seeking international experiences has significantly increased[25], as has the number of international students in Turkey's higher education system[2]. While studies on caregivers in Turkish culture providing care to foreign patients are common[9,26,27], the role of education in fostering intercultural sensitivity and empathy among international nursing students remains underexplored. This study aims to address this gap.

In the study, the mean total score of the Intercultural Sensitivity Scale for international nursing students was 89.83±12.39, indicating a moderate level, consistent with the literature[28-30]. Among the sub-dimensions, the highest score was in Interaction Engagement (25.60±3.93), and the lowest was in Interaction Enjoyment (11.14±2.31), suggesting openness to interaction but lower enjoyment. The literature links lower enjoyment levels to personal experiences, language barriers, and cultural differences[4,31]. Studies also report higher intercultural sensitivity among students who engage with individuals from different cultures and learn foreign languages[32-34]. Field practices involving cultural diversity are vital for enhancing nursing students' skills. The total mean score of the Multidimensional Empathy Scale (110.70±13.46) suggests that students generally possess good empathic abilities, aligning with the literatüre[35,36]. Among the sub-dimensions, the highest score was in Suffering (33.49±6.12), indicating emotional sensitivity to others' difficulties, while the lowest was in Emotional Contagion (6.68±2.03), reflecting a limited tendency to be influenced by others' emotions. A high score on the Suffering dimension may indicate that students are emotionally sensitive to the difficulties experienced by others. However, a low Emotional Contagion score

indicates that individuals have limited ability to be affected by the emotional states of others[37,38].

Although nursing students are sensitive to others' suffering, their limited emotional contagion may stem from insufficient emotional management and awareness. Lin et al[39]. found that students faced challenges such as pressure, emotional management issues, and lack of courage. These findings indicate that while students empathize with others' difficulties, their emotional involvement remains low, underscoring the need for educational interventions to enhance emotional awareness and empathic sensitivity in nursing education.

Empathy is a key tool for developing sensitivity to cultural differences, promoting understanding, acceptance, and respect[40]. This study found a positive relationship between international nursing students' empathy levels and their intercultural sensitivity. Significant correlations were observed between the total score on the Multidimensional Emotional Empathy Scale and sub-dimensions of the Intercultural Sensitivity Scale, including Interaction Engagement, Respect for Cultural Differences, Interaction Confidence, Interaction Enjoyment, and Interaction Attentiveness. These results highlight empathy's role in fostering effective and meaningful interactions across cultures. Prior studies also confirm that empathy enhances perceptions of different cultures and facilitates intercultural communication[18,26,41,42].

Conclusion

This study highlighted the importance of empathy in intercultural interactions, helping students communicate more effectively with different cultures. Therefore, nursing education should include programs focused on empathy and cultural awareness. Increasing activities and field applications based on intercultural interactions will allow students to better understand diverse cultures. Additionally, interactive training can help overcome obstacles like language barriers and cultural differences. Future research should assess the effectiveness of programs developing empathy and intercultural sensitivity and explore their practical impact on healthcare services.

Limitations

As this study was limited to international nursing students studying at a university in Istanbul, the generalizability of the findings is limited. Furthermore, because the data were collected based on the subjective statements of the participants, the results can be evaluated at a perceptual level. However, it is thought that the study will contribute to filling the knowledge gap in this area and shed light on future research to be conducted in different countries and cultures.

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Beslenmenin Karanlık Yüzü: Üniversite Öğrencileri Arasında Ortoreksiya Nervoza Eğilimi ve İlişkili Değişkenler

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Öz

Amaç: Bu çalışma, üniversite öğrencileri arasında ortoreksiya nevroza yaygınlığını ve bu olguyla ilişkili olabilecek değişkenleri incelemek amacıyla yürütülmüştür.

Yöntem: Kesitsel tasarım kullanılarak yürütülen bu araştırma, Haziran 2020 tarihinde bir Devlet Üniversitesinin Sağlık Bilimleri Fakültesinde öğrenimlerine devam etmekte olan 305 kadın (%74,6) 104 erkek (%25,4) olmak üzere toplam 409 üniversite öğrencisi ile gerçekleştirilmiştir. Veriler, kişisel bilgi formu ve Ortoreksiya-15 Ölçeği (ORTO-15) kullanılarak toplanmış ve Bağımsız Örneklem T-Testi, Tek Yönlü Varyans Analizi (ANOVA), Çok Değişkenli Binary Lojistik Regresyon analizi ile değerlendirilmiştir.

Bulgular: Araştırmaya katılan öğrencilerin % 26,7 sinin ortorektik eğilimlerinin bulunduğu ve kadın öğrencilerin erkek öğrencilere göre anlamlı düzeyde ortorektik oldukları bulunmuştur (p<0,05). Ayrıca tanısı konmuş sağlık sorunu olan, düzenli ilaç kullanan, vitamin desteği alan, sürekli bir diyet programı uygulayan ve düzenli fiziksel aktivite yapan kişilerin daha ortorektik olduğu tespit edilmiştir (p<0,05).

Sonuç: Öğrencilerin yaklaşık % 27'si riskli grupta yer almaktadır. Üniversite öğrencilerinin, düzensiz beslenme alışkanlıkları geliştirmeye karşı özellikle savunmasız oldukları bu dönemi iyi yönetememeleri yeme bozukluklarının artmasına neden olabilir. Bu kapsamda gençlere yönelik sağlıklı yaşam ve beslenme konularında eğitimler verilmesi önerilebilir. Risk grubunda yer alan bireyler için ise sağlıklı yaşamın obsesyona dönüşmesini önlemek üzere psikolojik destek sunulması yararlı olabilir. Ayrıca ortorektik eğilimlerden kaynaklanan riskleri ve sonuçları daha iyi anlamak için bu grupta daha fazla araştırma yapılması gerekmektedir.

Anahtar Sözcükler: Ortoreksiya nervoza, üniversite öğrencileri, beslenme.

The Dark Side of Nutrition: The Tendency to Orthorexia Nervosa Among University Students and Associated Variables

Abstract

Aim: This study was conducted to examine the prevalence of orthorexia nervosa among university students and the variables that may be related to this phenomenon.

Method: This research, which was carry out using a cross-sectional design, was conducted with a total of 409 university students, including 305 women (74.6 %) and 104 men (25.4 %), who are continuing their education at the Faculty of Health Sciences of a State University in June 2020. The data were collected using the personal information form and the Orthorexia-15 Scale (ORTHO-15) and evaluated by Independent Sample T-Test, One-Way Analysis of Variance (ANOVA), Multivariate Binary Logistic Regression analysis.

Results: It was found that 26.7 % of the students participating in the research had orthorexic tendencies, and female students were significantly orthorectic compared to male students (p < 0.05). In addition it has

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been determined that people who have a diagnosed health problems, use regular medications, take vitamin supplements, follow a constant diet program and engage in regular physical activity are more orthorectic (p < 0.05).

Conclusion: 27 % of the students are in the risky group. The inability of university students to manage this period well, in which they are especially vulnerable to developing irregular eating habits, may lead to an increase in eating disorders. In this context, it may be recommended to provide training on healthy living and nutrition for young people. For individuals in the risk group, it may be useful to provide psychological support to prevent a healthy life from turning into an obsession. Also more research needs to be done in this group in order to better understand the risks and consequences arising from orthorectic tendencies.

Keywords: Orthorexia nervosa, university students, nutrition.

Giriş

Ortoreksiya Nervoza (ON) "bir beslenme teorisi ya da belirli ayrıntıları farklılık gösterebilen bir dizi inançla tanımlanan sağlıklı beslenmeye takıntılı bir şekilde odaklanma; sağlıksız olarak algılanan yiyecek seçimleriyle ilişkili olarak abartılı duygusal sıkıntı; diyet seçimlerinin bir sonucu olarak ağırlık kaybı ortaya çıkması" şeklinde tanımlanmaktadır[1]. ON, bazı araştırmacılar tarafından bir tür yeme bozukluğu olarak kabul edilen, nispeten yeni bir sendromdur[2]. ON, henüz Uluslararası Hastalıklar ve İlgili Sağlık Sorunları İstatistiksel Sınıflandırması'na (ICD-11)[3] veya Mental Bozuklukların Tanısal ve İstatistiksel El Kitabı'na (DSM-5)[4] dahil edilmemiştir. Ortoreksiya Nervoza'nın tanımı ve klinik boyutu halen devam eden bir tartışma konusu olsa da, bu bozuklukla ilişkili psikopatolojiyi, komorbiditeyi ve fiziksel morbiditeyi daha iyi anlama ihtiyacı konusunda alanda bir fikir birliği bulunmaktadır[5].

Ortorektik bireyler, optimum sağlığı desteklediğine inandığı olumlu ve kısıtlayıcı beslenme uygulamalarıyla ilgili kompulsif davranışlar sergileyebilir, kendilerine empoze ettikleri beslenme kurallarını ihlal ettiklerinde, kaygı ve utancın eşlik ettiği abartılı hastalık korkusu, kişisel kirlilik duygusu ve/veya olumsuz fiziksel duyumlar yaşayabilirler. Ayrıca diyet kısıtlamaları zamanla artabilir ve tüm besin gruplarının ortadan kaldırılmasını da içerebilir. Aynı zamanda arındırıcı veya detoksifiye edici olarak kabul edilen, giderek daha sık ve/veya şiddetli "temizlenme dönemleri" (kısmi oruç) olabilir. Bu diyet kısıtlamaları genellikle ağırlık kaybına neden olmakla birlikte ortorektik bireylerde ağırlık kaybı arzusu yoktur veya sağlıklı beslenme düşüncesine tabidir. Bunlara ek olarak kompulsif davranış ve zihinsel meşguliyet klinik açıdan zarar verici hale gelmektedir. Kişide yetersiz beslenme, aşırı ağırlık kaybı veya kısıtlı beslenmeden kaynaklı çeşitli tıbbi komplikasyonlar oluşabilmekte, sağlıklı beslenmeyle ilgili inanç veya davranışlara bağlı olarak kişisel sıkıntı ya da sosyal, akademik veya mesleki işlevsellikte bozulmalar meydana gelebilmektedir. Ayrıca olumlu beden imajı, öz değer, kimlik ve/veya tatmin duygusu, kişinin kendi tanımladığı sağlıklı beslenme davranışına aşırı derecede bağımlı hale gelmektedir[1].

Ortorektikler, diyetlerinin sağlığa faydalarına ilişkin fikirlere aşırı değer verirler. Bununla birlikte, ima edilen gıda kısıtlamaları ve sağlıksız gıdalardan katı bir şekilde kaçınılması sağlıksız olarak değerlendirilmektedir[6]. Ortorektikler, tipik olarak gıda tüketimini saf ve sağlıklı olduğuna inandıkları şeylere göre kısıtlarlar, çünkü temel motivasyonları "optimum sağlığa" ulaşmaktır[7]. Ancak sağlıklı beslenmeye yönelik bu aşırı endişe farklı boyutlarda birçok bozukluğa, örneğin beslenme eksikliklerine, yetersiz

beslenmeye ve istenmeyen/ sağlıksız ağırlık kaybına yol açabilir[8]. Bunların yanı sıra sosyal bağların bozulması ve dışarı yemeğe çıkmaktan kaçınma, eliminasyon ve azaltma diyetlerine bağlı yetersiz beslenme (protein, B_{12} vitamini, demir, sodyum eksiklikleri vb.), rabdomiyoliz (kas yıkımı), metabolik asidoz ve karaciğer enzimlerinde yükselme gibi sağlık sorunlarını da beraberinde getirebilmektedir[9].

Yapılan birçok çalışmada ON ile yeme bozuklukları arasında ilişki olabileceği vurgulanmıştır. ON'nın özellikle Anoreksiya Nevroza (AN) ile benzer klinik özellikleri olduğu belirtilmektedir[10,11]. Ortoreksiya Nervoza'da, anoreksiyada olduğu gibi, tüketilen gıdaların kalori değerini saymaya, tüm yağlı ve sindirimi kolay olmayan gıdalardan vazgeçmeye yönelik takıntılı, sistematik bir odaklanma vardır[6]. Öte yandan Anoreksiya ve Bulimiya Nervoza'dan (BN) farklı olarak, hastanın odak noktası yalnızca tüketilen miktar ve ağırlık kaybı değil, daha da önemlisi tüketilen gıdanın kalitesi ve iyi sağlığın sürdürülmesidir[12]. Yapılan bir araştırmada, sağlıklı gıdalara yüksek düzeyde ilgi gösteren katılımcıların aynı zamanda vücut görünümleriyle de aşırı ilgili olduğu ve bunun AN'lı hastalarda da bulunan özelliklerden biri olduğu belirtilmiştir[13]. Nitekim yapılan araştırmalar ON ile vücut ağırlığını düşürme çabası, çarpık benlik imajı ve benlik saygısı arasında bir korelasyon olduğunu, bunun da ON ile AN arasında bir ilişkiyi işaret ettiğini ortaya koymuştur[13,14]. Ayrıca literatürde ON eğilimi olan bireylerin, sağlıklı beslenme konusunda takıntılarının AN gibi daha ciddi bir patolojiyi benimsemelerine yol açabileceğine dikkat çekilmektedir[15]. Mac Evilly (2001)[16], ON'ın ayrı bir bozukluktan ziyade yeme bozukluğu gelişiminin başlangıç aşaması olarak değerlendirilmesi gerektiğini öne sürmektedir. Bu bulgular, sağlıklı beslenmeyle ilgili endişelerin, AN veya BN gelişimi için predispozan bir faktör ve potansiyel olarak hastalığın nüksetmesini destekleyebilecek önemli bir kalıntı semptom olarak hareket edebileceğine işaret etmektedir[17]. Bu araştırmalar ON'nın etiyolojisine ve yeme bozukluklarıyla ilişkisine dair önemli bulgular sağlamakta ve bu karmaşık yapıyı daha geniş bir bağlamda değerlendirmenin önemini vurgulamaktadır.

Literatür incelendiğinde Ortoreksiya Nervoza ile ilgili çalışmaların son yıllarda artış gösterdiği dikkat çekmektedir. Yapılan araştırmaların büyük bir kısmı ON'nın yaygınlık oranlarını belirlemeye[18-20] ve tanı kriterlerinin yeme bozuklukları ile ilişkisini değerlendirmeye odaklanmıştır[2,6,21,22]. Bunun yanı sıra araştırmaların, ON'nın, obsesif kompulsif bozukluk, mükemmeliyetçilik, bilişsel katılık, narsizm, kontrol ihtiyacı, öz-disiplin[5,23-27], bağlanma stilleri[28], kişiliğin genel boyutları[29,30] ve kişilik özellikleri[31] gibi bireysel ve psikolojik değişkenlerle olan ilişkisini ele aldığı görülmektedir. Bu çalışmalar, ON'nın bireysel farklılıklar ve psikolojik değişkenlerle olan ilişkisine ışık tutmakla birlikte, demografik ve sağlık temelli değişkenler açısından daha geniş bir perspektif sunan çalışmaların sınırlı olduğunu göstermektedir. Bu bağlamda, bu değişkenleri dikkate alan bir araştırmanın yapılması, ON'nın etiyolojisinin daha kapsamlı bir şekilde anlaşılmasına katkı sağlayacak ve literatürdeki önemli bir boşluğu dolduracaktır.

Yaşam tarzı alışkanlıkları ve yiyecek tüketimi, bebeklik dönemi ile başlayıp, ergenlik ve gençlik döneminde tam anlamıyla şekillenmektedir. Gençlerin ve özellikle üniversite öğrencilerinin beslenmesi, önemli yaşam tarzı değişikliklerini beraberinde getirebileceğinden önemli bir sorundur. Üniversite öğrencilerinin kendi beslenme alışkanlıklarının sorumluluğunu almaya başladıkları ve yeme davranışlarının pekiştiği

bu kritik dönem onları beslenme açısından daha savunmasız hale getirmektedir[32]. Bunlara ek olarak genç yetişkinlik dönemi, vücut imajı gelişimi için de kritik bir dönemidir[33]. Bu çağlarda pekiştirilen davranışların çoğunun yetişkinlik boyunca devam ettiği göz önünde bulundurulduğunda, genç yetişkinlik dönemi yeme bozukluklarının öngörücülerini ve risk faktörlerini değerlendirmek için güçlü gelişimsel göstergeleri temsil etmektedir[34]. Bu davranışların, yetişkinlikte ve daha sonraki dönemde metabolik hastalıklar gibi olumsuz sonuçlara neden olabileceğinden ele alınması önemlidir. Bu kapsamda bu çalışmanın amacı, üniversite öğrencileri arasında Ortoreksiya Nevroza yaygınlığını ve bu olguyla ilişkili olabilecek değişkenleri incelemektir. ON, nispeten yeni bir olgudur, tanı kriterleri, sınıflandırma yöntemleri ve temel mekanizmaları hala tartışılmakta ve sorgulanmaktadır[35]. Yapılan çalışmanın ON'ya ilişkin anlayışı geliştirmek üzere literatüre katkı sağlayacağı düşünülmektedir.

Gereç ve Yöntem

Araştırmanın Amacı ve Türü

Bireylerin Ortoreksiya eğilimlerinin çeşitli faktörler açısından incelenmesinin amaçlandığı bu çalışma, nedensel karşılaştırma modeli ile uyumlu nicel bir araştırma olarak tasarlanmıştır[36]. Bu çalışmanın bağımsız değişkenlerini cinsiyet, tanısı konmuş bir sağlık sorunu, düzenli ilaç kullanımı, sürekli uygulanan diyet tedavisinin olması, vitamin desteği, doğru beslenme bilgilerine erişildiğinde beslenme davranışlarının değişimi ve fiziksel aktivite yapma durumu oluştururken, bağımlı değişkenini ise ON puanları oluşturmaktadır.

Araştırma Grubu

Çalışmaya katılacak bireylerin seçiminde rastgele veya rastgele olmayan örneklemenin zor olması durumlarında kullanılan kolayda örnekleme yöntemi tercih edilmiştir. Araştırmanın çalışma gurubunu 2019-2020 eğitim öğretim yılı bahar döneminde Gümüşhane Üniversitesi Sağlık Bilimleri Fakültesi'nde öğrenimlerine devam etmekte olan 305 kadın (%74,6) 104 erkek (%25,4) olmak üzere toplam 409 üniversite öğrencisi oluşmaktadır. Katılımcıların yaşları 17 ile 34 arasında değişmekte ve yaşları ortalaması 20,89±1,69 yıldır.

Veri Toplama Araçları

Kişisel Bilgi Formu: Araştırmacılar tarafından oluşturulan ve ortoreksiya riskinin anlamlı farklılaşacağı düşünülen yaş, cinsiyet, tanısı konmuş bir sağlık sorunu, düzenli ilaç kullanımı, sürekli uygulanan diyet tedavisinin olması, vitamin desteği, doğru beslenme bilgilerine erişildiğinde beslenme davranışlarının değişimi ve fiziksel aktivite değişkenleri hakkında bilgi toplanan formdur.

Orto-15 Ölçeği: Donini ve arkadaşlarının (2005)[37] ORTO-15 ölçeği, Bratman'in 10 soruluk Ortoreksiya[38] kısa soru kağıdı baz alınarak geliştirilmiştir. Bratman'ın bazı soruları çıkarılıp yerlerine farklı sorular eklenmiştir. Son haliyle ORTO-15 ölçeği, Donini ve arkadaşları (2004, 2005)[37,39] tarafından Bratman'in kısa soru kağıdı uyarlanarak ilk olarak İtalya'da Latinler için geliştirilmiş ve Ortoreksiya Nervoza eğilimini değerlendirmek için düzenlenmiş 15 maddelik bir kendini değerlendirme ölçeğidir. Maddeler şimdiki zamanda, 4 dereceli formatta cevaplanacak biçimde yazılmıştır.

Ölçekte, bireylerin kendilerini ne sıklıkla maddelerde tarif edildiği şekilde hissettiklerini "her zaman", "sık sık", "bazen" ve "hiçbir zaman" seçeneklerinden birini işaretleyerek belirtmeleri istenmektedir. Maddeler, bireylerin seçme, satın alma, hazırlama ve kendilerinin sağlıklı olarak nitelendirdikleri besinleri tüketme konularındaki obsesif davranışlarını araştırmaktadır[37]. Arusoğlu (2006)[40] tarafından Türkçeye uyarlanan Orto-15 ölçeğinin kesme puanı 33 olarak belirlenmiştir. Buna göre 33 puan ve altında alanlar ortorektik olarak tanımlanmakta, puan ne kadar artarsa yeme davranışı o kadar aşırı duyarlılıktan normale yaklaşmaktadır. Uyarlama çalışması kapsamında ölçeğin iç tutarlık katsayısı 0,44 olarak tespit edilmiştir. Bu çalışma kapsamında ise iç tutarlık katsayısı 0,71 olarak hesaplanmıştır.

Prosedür

Veri toplamak için öncelikle Gümüşhane Üniversitesi Etik Kurulundan 11.03.2020 tarihli 95674917-108.99-E.14995 onay numarası ile bilimsel araştırma ve etik kurul onayı alınmıştır. 1975 Helsinki Bildirgesi doğrultusunda etik kurallara uygun olarak yürütülen bu çalışma için veriler Gümüşhane Üniversitesi Sağlık Bilimleri Fakültesinde öğrenimlerine devam etmekte olan öğrencilerden araştırmaya katılımda gönüllü olanlar arasından yüz yüze yöntemlerle toplanmıştır. Tüm katılımcılara toplanan verilerin gizli tutulacağı güvencesi verilmiştir.

Verilerin Analizi

Öncelikle analizlere başlamadan önce veri seti, kayıp veri ve uç değerler bakımından incelenmiştir. Elde edilen sonuçlara göre veri setinde kayıp veri olmadığı, 7 verinin uç değer barındırdığı tespit edilmiş ve veri setinden çıkarılarak analizler 409 katılımcıdan elde edilen verilerle yürütülmüştür. Ardından verilerin normal dağılım varsayımını karşılama durumlarının belirlenmesi amacıyla basıklık ve çarpıklık değerleri incelenmiştir. Çalışma grubundan elde edilen verilere göre çalışma grubunun ON puanlarının 19,00 ile 53,00 arasında değiştiği, grup ortalamasının ise 37,10 (SS=5,94) olduğu tespit edilmiştir. Ayrıca ölçeğe yönelik basıklık ve çarpıklık değerleri incelenmiş, çarpıklık değerinin -1,06 (SH = ,12), basıklık değerinin ise -,88 (SH=,24) olduğu tespit edilmiş, bu haliyle ölçekten elde edilen puanların basıklık ve çarpıklık değerlerinin ±1,5 aralığında olduğu görülmüş ve normal dağılıma uygun olduğuna karar verilmiştir[41].

Bu çalışma iki aşamada yürütülmüştür. Birinci aşamada ON puanlarının demografik değişkenler açısından anlamlı farklılık gösterip göstermeme durumu Bağımsız Örneklem T-Testi ve Tek Yönlü Varyans Analizi (ANOVA) kullanılarak SPSS 24 programı aracılığıyla incelenmiştir. İkinci aşamasında ise ON puanları Arusoğlu'nun (2006)[40], belirlemiş olduğu 33 kesme puanına göre ortorektik olanlar ve olmayanlar olarak sınıflandırılmıştır. Ardından kadın olma ve diğer demografik değişkenlere sahip olma durumları 1, erkek olma ve değişkenlerin özelliklerine sahip olmama durumları 0 olarak kodlanmış ve referans değer olarak 0 alınmıştır. Böylelikle demografik değişkenlerin Çok Değişkenli Binary Lojistik Regresyon analizi ile ortoreksiya riski üzerindeki etkileri değerlendirilmiştir.

Bulgular

Mevcut araştırmaya 409 üniversite öğrencisi katılmıştır. Katılımcılara ait demografik değişkenler Tablo 1'de sunulmuştur.

Tablo 1. Demografik değişkenlere göre ON

Değişkenler			ON Var (%)	Yok (%)	Toplam	Ort± Ss	t/F/ η²
Cinsiyet	**Kadın**	**n**	86	219	305	36,74±5,74	$t_{(407)}$= -2,08, **P< ,05**, η²=,01
		Grup İçi	28,2	71,8	100,0		
		ON İçinde	78,9	73,0	74,6		
	Erkek	**n**	23	81	104	38,14±6,45	
		Grup İçi	22,1	77,9	100,0		
		ON İçinde	21,1	27,0	25,4		
Tanısı konmuş sağlık sorununuz var mı?	**Evet**	**n**	26	50	76	35,41±6,49	$t_{(407)}$= -2,77, **P< ,05**, η²=,02
		Grup İçi	34,2	65,8	100,0		
		ON İçinde	23,9	16,7	18,6		
	Hayır	**n**	83	250	333	37,49±5,76	
		Grup İçi	24,9	75,1	100,0		
		ON İçinde	76,1	83,3	81,4		
Düzenli ilaç kullanıyor musunuz?	**Evet**	**n**	20	35	55	34,80±6,60	$t_{(407)}$= -3,11, **P< ,05**, η²=,02
		Grup İçi	36,4	63,6	100,0		
		ON İçinde	18,3	11,7	13,4		
	Hayır	**n**	89	265	354	37,46±5,77	
		Grup İçi	25,1	74,9	100,0		
		ON İçinde	81,7	88,3	86,6		
Sürekli uyguladığınız bir diyet tedaviniz var mı?	**Evet**	**n**	15	3	18	29,89±5,88	$t_{(407)}$= -5,44, **P< ,05**, η²=,07
		Grup İçi	83,3	16,7	100,0		
		ON İçinde	13,8	1,0	4,4		
	Hayır	**n**	94	297	391	37,43±5,74	
		Grup İçi	24,0	76,0	100,0		
		ON İçinde	86,2	99,0	95,6		
Vitamin desteği alıyor musunuz?	**Evet**	**n**	24	45	69	35,36±6,35	$t_{(407)}$= -2,68, **P< ,05**, η²=,02
		Grup İçi	34,8	65,2	100,0		
		ON İçinde	22,0	15,0	16,9		
	Hayır	**n**	85	255	340	37,45±5,81	
		Grup İçi	25,0	75,0	100,0		

		ON İçinde	78,0	85,0	83,1	
Doğru beslenme bilgilerine eriştiğinizde davranışlarınız değişir mi?	**Her Zaman (1)**	**n**	19	7	26	29,96±6,18
		Grup İçi	73,1	26,9	100,0	
		ON İçinde	17,4	2,3	6,4	
	Sıksık (2)	**n**	45	97	142	35,50±5,19
		Grup İçi	31,7	68,3	100,0	
		ON İçinde	41,3	32,3	34,7	$F_{(3,405)}= 27,23$, P< ,05, η²=,17
	Nadiren (3)	**n**	41	179	220	38,71±5,34
		Grup İçi	18,6	81,4	100,0	
		ON İçinde	37,6	59,7	53,8	
	Hiçbir Zaman (4)	**n**	4	17	21	39,90±7,15
		Grup İçi	19,0	81,0	100,0	
		ON İçinde	3,7	5,7	5,1	
Düzenli olarak fiziksel aktivite yapıyor musunuz?	**Evet**	**n**	44	80	124	35,44±6,54
		Grup İçi	35,5	64,5	100,0	
		ON İçinde	40,4	26,7	30,3	$t_{(407)}= -3,78$, **P< ,05**, η²=,03
	Hayır	**n**	65	220	285	37,82±5,53
		Grup İçi	22,8	77,2	100,0	
		ON İçinde	59,6	73,3	69,7	

Araştırma kapsamında öncelikle cinsiyete dayalı farklılıklar incelenmiştir. Tablo 1 incelendiğinde kadınların %28,2'sinin erkeklerin ise %22,1'inin ortorektik oldukları görülmektedir. Ortorektikler arasında kadınların oranının %78,9 olduğu, erkeklerin ise %21,1'lik kısmı oluşturduğu dikkat çekmektedir. Ayrıca yapılan bağımsız t testi sonuçlarına göre kadınların (X=36,74±5,74), erkeklere göre (X=38,14±SS=6,45) anlamlı düzeyde ortorektik oldukları tespit edilmiştir ($t_{(407)}$=-2,08; p<,05; η²=,01). Ayrıca 409 katılımcının 109'unun (%26,7) ortorektik olduğu belirlenmiştir.

Tanısı konmuş sağlık sorunları olanların %34,2'si, konmayanların ise %24,9'unun ortorektik oldukları; tanısı konmuş bir sağlık sorunu olanların (X=35,41±6,49) herhangi bir sağlık sorunu olmayanlara göre (X=37,49±5,76) anlamlı düzeyde daha ortorektik oldukları bulunmuştur ($t_{(407)}$=-2,77; p<,05; η²=,02). Tablo 1 incelenmeye devam edildiğinde düzenli ilaç kullananların % 36,4'ünün, kullanmayanların %25,1'inin ortoreksiya nevroza eğilimi sergilediği görülmektedir. Ayrıca düzenli ilaç kullananların (X=34,80±6,60), kullanmayanlara göre (X=37,46±5,77) istatistiksel olarak anlamlı düzeyde ortorektik oldukları sonucuna varılmıştır ($t_{(407)}$=-3,11; p<,05; η²=,02).

Tablo 1'e göre katılımcılardan ON eğilimi olanların % 83,3'ünün sürekli uyguladığı bir diyet programı olduğu ve sürekli diyet programı uygulayan bireylerin (X=29,89±5,88), uygulamayanlara göre (X=37,43±5,74) anlamlı düzeyde ortorektik oldukları dikkat çekmektedir ($t_{(407)}$=-5,44; p<,05; η^2=,07).

Araştırma kapsamında katılımcıların vitamin desteği alıp almadıkları incelenmiş ve buna göre vitamin desteği alanların %34,8'inin, doğru beslenme bilgilerine eriştiklerinde her zaman davranışlarını değiştirenlerin ise %73,1'inin ortorektik olduğu saptanmıştır. Ek olarak vitamin desteği alanların (X=35,36±6,35) almayanlara göre (X=37,45±5,81); doğru beslenme bilgilerine eriştiğinde her zaman davranışlarını değiştirenlerin (X=29,96±6,18) diğer gruplara göre daha ortorektik oldukları sonucuna ulaşılmıştır.

Tablo 1'de görüldüğü üzere katılımcılardan düzenli fiziksel aktivite yapanların %35,5'inin, fiziksel aktivite yapmayanların ise %22,8'inin ortorektik oldukları bulgulanmıştır, Ayrıca fiziksel aktivite yapanların (X=35,44±6,54), yapmayanlara göre (X=37,82±5,53) anlamlı düzeyde daha ortorektik oldukları saptanmıştır.

Yukarıda gerçekleştirilen tanımlayıcı bulguların ardından, katılımcıların ON ölçeğinden aldıkları puanlar, ≤33 kesme puanına göre ortorektik olma ve olmama durumuna göre sınıflandırılmış ve demografik değişkenlerin ON üzerindeki etkileri Çok Değişkenli Binary Lojistik Regresyon analizi aracılığıyla test edilmiştir (Tablo 2).

Tablo 2. Ortoreksiya riskini artırmada etkili olan değişkenlere yönelik lojistik regresyon analizi sonuçları

		B	SH	Wald	*Sd*	P	OR	%95 CI	
								Alt	Üst
Cinsiyet		,39	,30	1,60	1,00	,21	1,47	,81	2,67
Tanısı Konmuş Sağlık Sorunu (1)		,11	,35	,10	1,00	,75	1,12	,56	2,21
Düzenli İlaç Kullanımı (1)		,07	,40	,03	1,00	,86	1,07	,49	2,36
Sürekli Uygulanan Diyet (1)		2,65	,68	15,06	1,00	,00	14,19	3,71	54,19
Vitamin Desteği (1)		,09	,34	,06	1,00	,80	1,09	,56	2,10
Düzenli Fiziksel Aktivite (1)		,54	,26	4,18	1,00	,04	1,72	1,02	2,88
Doğru Beslenme Bilgilerine Eriştiğinde Davranış Değişimi	**Her Zaman (1)**	2,51	,76	10,80	1,00	,00	12,34	2,76	55.22
	Sık Sık (1)	,72	,64	1,24	1,00	,27	2,05	,58	7.21
	Nadiren (1)	,18	,64	,08	1,00	,78	1,20	,34	4.16
Constant		1,41	,56	6,30	1,00	,01	4,09		
Nagelkerke R²= ,21; Hosmer And Lemeshow Test= $X^2_{(7)}$= 6,25; P = ,51									

0= Yok, 1= Var, Referans kategori= 1. SH=Standart Hata, Sd= Serbestlik derecesi, OR= Odss Ratio (Odss Oranı)

Tablo 2'deki sonuçlar da göz önüne alınarak, katılımcıların ortorektik olma ve olmama durumunda etkili olabileceği düşünülen değişkenler ile gerçekleştirilen Çok Değişkenli Binary Lojistik Regresyon analizinin istatistiksel olarak anlamlı olduğu belirlenmiştir

($X^2_{(9)}$=63,43; p<,001). Model Nagelkerke R^2 katsayısı ile ortorektik olma üzerindeki değişimin %21'ini açıklamakta ve katılımcıların %78,5'ini doğru olarak kategorilere ayırmaktadır. Bağımsız değişkenlerden sürekli uygulanan diyet tedavisine sahip olma (OR=14,19; %95 CI=[3,71, 54,19]; p<,001), düzenli fiziksel aktivite yapma (OR=1,72; %95 CI=[1,02, 2,88]; p<,05) ve doğru beslenme bilgilerine eriştiğinde davranışlarını her zaman değiştirme durumu (OR=12,34; %95 CI=[2,76, 55,22]; p<,01) istatistiksel açıdan anlamlı olarak ON riskinde artış ile ilişkili bulunmuştur. Buna göre düzenli fiziksel aktivite yapma durumundaki 1 birimlik artış ON riskinde 1,72 kat artışa, doğru beslenme bilgilerine eriştiklerinde beslenme davranışlarını her zaman değiştirme durumundaki 1 birimlik artış ise ON riskinde 12,34 kat artışa neden olmaktadır. Diğer taraftan sürekli uygulanan diyet tedavisine sahip olma durumunda 1 birimlik bir artışın meydana gelmesi durumunun ise ON riskinde 14,19 kat bir artmaya neden olduğu belirlenmiştir.

Tartışma

Bu çalışmada, üniversite öğrencilerinin ON eğilimlerinin sosyo demografik faktörler açısından incelenmesi amaçlanmıştır. Bu kapsamda yapılan analizler sonucunda 409 katılımcının (%26,7) 109'unun ortorektik olduğu belirlenmiştir. ON prevalansı tanısal kesme kriterlerine, kullanılan araca veya coğrafi bölgeye bağlı olarak değişiklik gösterebilir. Varga ve arkadaşları (2013)[42], ortoreksiya nervozanın ortalama yaygınlık oranının genel nüfus arasında %6,9, yüksek riskli gruplarda (sağlık çalışanları, sanatçılar) ise %35-57,8 olduğunu bulmuş, ayrıca diyetisyenler ve diğer sağlık çalışanlarının yüksek risk grubunda olduğunu belirtmiştir. Reynolds (2018)[20], Avusturya Sidney'deki bir üniversitede ON yaygınlık oranının %6,5 olduğunu saptamıştır. Brytek-Matera ve arkadaşları (2020)[43], ise üniversite öğrencileri arasında ON yaygınlık oranlarını İspanyol öğrenci grubu için %2,3 ve Polonya örneklemi için %2,9 olarak belirlemiştir. Türkiye'de Bitlis Eren Üniversitesinde 474 öğrenci ile gerçekleştirilen bir çalışmada öğrencilerin %41,3'ünün (n=197) ON eğilimine sahip olduğu saptanmıştır[44]. Yine Türkiye'de İnönü Üniversitesi'nde 1014 kişi ile yürütülen bir diğer araştırmada, öğrencilerde ortoreksiya sıklığı %12,2 olarak bulunmuştur[45]. Bu araştırmada görülme sıklığının yüksek olmasının sebebinin, araştırma grubunu oluşturan Sağlık Bilimleri Fakültesi öğrencilerinin sağlıklı ve doğru beslenme konusunda oldukça hassas davranışlara sahip olması ile ilişkili olduğu düşünülmektedir. Sağlık bilimleri eğitimlerine devam eden öğrencilerin beslenmenin sağlığımız üzerindeki etkileri konusunda diğer fakültelere göre daha yüksek düzeyde bilgiye sahip olmaları bu konuda daha duyarlı olmalarına neden olabilmektedir.

Araştırma kapsamında, ON eğilimi olan kadınların oranının erkeklere göre yaklaşık 4 kat daha fazla olduğu ve kadınların erkeklere göre anlamlı düzeyde ortorektik oldukları tespit edilmiştir. Literatürde bu konuda tutarsız bulguları bulunduğu dikkat çekmektedir. Bazı çalışmalar erkeklerin Ortoreksiya Nevroza eğiliminin kadınlardan yüksek olduğunu bildirmekte[10,37], bazı araştırmalar da cinsiyetler arası bir fark bulunmadığını belirtmektedir[26,46]. Diğer taraftan mevcut araştırmanın bulgularıyla tutarlı olarak, birçok çalışmada kadınların bu soruna karşı daha hassas oldukları ifade edilmektedir[42,47,48]. Örneğin Oğur ve arkadaşları (2015)[44], tarafından 474 üniversite öğrencisi ile yapılan bir araştırma sonucunda kadın öğrencilerin erkek öğrencilere göre ON açısından yüksek risk grubunda olduğu belirlenmiştir. Yine yapılan bir başka

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araştırmada gerçekleştirilen lojistik regresyon analizi, cinsiyetin ORTO-15 puanlarını etkilediğini ve kadınlarda ON riskinin erkeklere göre 2,5 kat daha fazla olduğunu göstermiştir[48]. Cinsiyet, kişinin vücut imajına ilişkin tutum ve algısı da dahil olmak üzere, yaşamın birçok yönünde kritik bir faktördür[49]. Gerçekten de, duyguların içselleştirilmesi ve dışsallaştırılmasıyla ilgili bir dizi özellik vardır ve bu özellikler ruhsal bozukluklarda cinsiyete göre farklı yaygınlık oranlarını açıklayabilir[50]. Mevcut çalışmanın sonuçları açısından ise bulgular, kadınların erkeklere göre daha fazla sağlığı teşvik edici davranışa ve daha sağlıklı yaşam tarzı kalıplarına sahip olmasıyla açıklanabilir[51]. Nitekim yapılan bir çalışmada kadınların düşük kalorili gıda tüketimine, ağırlık kontrolüne ve fiziksel görünümüne erkeklerden daha fazla dikkat ettiği vurgulanmıştır[52].

Yapılan çalışma sonucunda tanısı konmuş bir sağlık sorunu olanların herhangi bir sağlık sorunu olmayanlara; düzenli ilaç kullananların da kullanmayanlara göre istatistiksel olarak anlamlı düzeyde ortorektik oldukları belirlenmiştir. Erkin ve Göl (2019)[53], kronik hastalıkların varlığının ON eğilimini önemli ölçüde arttırdığını bildirmiştir. 69 araştırmanın dahil edildiği bir inceleme çalışmasında da kronik hastalıkların ve bunların tedavisinin bireylerde sağlıklı beslenme takıntısı oluşturabileceği ifade edilmektedir[54]. Diğer bir araştırmada kronik hastalık varlığının ortoreksiya eğilimi açısından bir fark yaratmadığı bildirilmiştir[40]. Kronik hastalıkların ON'u nasıl etkilediği konusunda sınırlı sayıda çalışma bulunmaktadır. Bu konuda daha fazla araştırmaya ihtiyaç olduğu açıktır. Diyabet, çölyak gibi belirli hastalıklar özel diyet uygulamaları gerektirmektedir. Özellikle çölyak hastalığında glutensiz diyet gibi uzun süreli diyet kısıtlaması olan kişiler, ortorektik özellikler açısından risk altında görünmektedir. Bu noktada hastalara kısıtlayıcı diyetler reçete ederken, klinisyenlerin ve beslenme uzmanlarının gıdaları tanımlamak için kullandıkları dil çok önemlidir. Örneğin, gıdaların zarar verdiğine dair inançları güçlendirmemek için "iyi/güvenli" veya "kötü/güvensiz" gibi ifadelerin kullanımından kaçınmak uygun olabilir.

Ayrıca mevcut çalışmada sürekli diyet programı uygulayan bireylerin, uygulamayanlara göre anlamlı düzeyde ortorektik oldukları saptanmıştır. Bu durum yapılan çok değişkenli lojistik regresyon bulguları tarafından da desteklenmektedir. Elde edilen sonuçlar, düzenli bir diyet programına sahip olma durumunda meydana gelen 1 birimlik bir artışın ortoreksiya riskinde 14,19 kat bir artışla sonuçlanacağını göstermektedir. Literatürde çeşitli diyetler uygulamanın bazı bireyleri aşırı yeme alışkanlıkları edinmeye yönlendirebileceği belirtilmektedir[14,54]. ON'un karakteristik özelliği de uygulanan diyet kısıtlamalarının kademeli olarak yoğunlaşmasıdır. ON olan kişiler yemekleri büyük bir özen ve dikkatle hazırlamaktadır. Empoze edilen normdan herhangi bir sapma bireyde korku, suçluluk, utanç duygusu ve daha fazla diyet kısıtlamasına yol açmaktadır[55,56]. Bu bilgiler doğrultusunda ON ile diyet uygulaması arasında bir ilişki olması beklenen bir durumdur. Bu sonuçlar diyet kalıplarıyla ilişkili davranışların, ON gelişimine katkıda bulunan bir faktör olabileceğini düşündürmektedir. Bu nedenle bu hasta grubunda pratisyen hekim, gastroenterolog, diyetisyen ve psikologdan oluşan multidisipliner bir ekibin iş birliği içinde olması gerekmektedir.

Literatür incelendiğinde, diyet uygulamaları ve ON arasındaki ilişkileri inceleyen araştırma sonuçlarının mevcut çalışma bulgularını desteklediği söylenebilir. Örneğin

diyet ve fiziksel aktivitenin ON eğilimine etkisini inceleyen bir araştırma sonucuna göre diyet yapma konusundaki yüksek düzey endişe, bulimik davranış ve sağlıklı beslenmeyle ilişkili sorunları öngörmektedir[57]. Ortoreksiya nervoza, yeme alışkanlıkları ve kişilik özellikleri arasındaki ilişkileri inceleyen ve 664 üniversite öğrencisi ile yürütülen bir araştırmada diyet yaptığını bildiren öğrencilerin ON gösterme olasılığı, diyet yapmayanlara göre daha yüksek bulunmuştur[58]. Benzer olarak üniversite öğrencileri arasında ON yaygınlığını belirlemek üzere 448 öğrenci ile yürütülen bir çalışmada, vejetaryen diyet ve özel bir diyet tüketmek gibi davranışların ON eğiliminin anlamlı belirleyicileri olduğu saptanmıştır[59]. Yine vejeteryan diyet uygulamaları ile ortoreksiya nervoza arasındaki ilişkiyi inceleyen yakın tarihli bir meta analiz sonucunda elde edilen kanıtlar, vejetaryen diyet uygulayan bireylerin daha ortorektik davranışlar gösterdiğini ortaya koymuştur[60]. Diğer taraftan vegan/vejetaryen ve vegan olmayan/vejetaryen olmayan bireylerin ortoreksiya nervoza belirtilerini ve beslenme alışkanlıklarını incelemeyi amaçlayan bir başka çalışma sonucunda, vegan diyet uygulamalarının sağlıklı beslenme takıntısıyla ilişkili olmadığı belirlenmiştir[61]. Çalışmalar arasındaki bu tutarsızlıkların çalışma tasarımı ya da ölçme araçlarındaki farklılıklardan kaynaklanabileceği düşünülmektedir. Belirtilen çalışmaların çoğu kesitsel bir çalışma tasarımı kullandığından, bir diyet uygulamasının ortorektik yeme davranışına herhangi bir katkısını açıklığa kavuşturmak mümkün görünmemektedir. Bu nedenle, gelecekteki araştırmalar diyet uygulamalarının ortorektik yeme davranışına olası etkisini incelemek üzere uzunlamasına bir yaklaşımı dikkate almalıdır. Uzunlamasına bir çalışma, bireysel değişim modellerini gözlemleme fırsatı sağlamaktadır. Bu tür araştırmalar bireyler arası farklılıklar hakkında tahmin modeli geliştirmek için ilgili bilgileri yakalar ve bu etkilerin bireyler arası farklılıklardan ayırt edilmesine izin verir[62]. Bu nedenle uzunlamasına araştırmalar ortorektik davranışlar için prognostik faktörleri belirleme olanağı sunacaktır.

Çalışma sonucunda vitamin desteği alanların almayanlara göre istatistiksel olarak anlamlı düzeyde ortorektik olduğu bulunmuştur. Çeşitli çalışmalarda besin takviyesi ve vitamin desteği alma durumu ile ON eğilimi arasında bir ilişki bulunmadığı bildirilmektedir[12,63]. Yapılan bir çalışmada da her iki cinsiyette ortorektik semptomlar ile multivitamin ve ß-glukan kullanımı arasında pozitif bir etkileşim olduğu belirlenmiştir. Aynı çalışmada ON semptomları ile kadınlarda Pelargonium Sidoides, C ve D vitamini kullanımı arasında da pozitif bir korelasyon bulunmuştur[64]. Son yıllarda yaygın olan influenza salgınları, bireylerin bu hastalıklara yakalanma riskini en aza indirmek ve bağışıklığı güçlendirmek amacıyla bu takviyeleri almaya yönlendirmiş ve sağlık takıntısının artmasına neden olmuş olabilir. Bu durumun da bireylerde ortorektik eğilimlerin artmasına yol açtığı düşünülmektedir.

Araştırma kapsamında doğru beslenme bilgilerine erişildiğinde her zaman davranışlarını değiştiren katılımcıların, diğer gruplara göre anlamlı düzeyde ortorektik oldukları sonucuna ulaşılmıştır. Gerçekleştirilen regresyon analizine göre de doğru beslenme bilgilerine erişildiğinde davranışlarını her zaman değiştirme durumu istatistiksel açıdan anlamlı olarak ortoreksiya riskinde artış ile ilişkili bulunmuştur. Yani ON eğilimi olan kişilerin, uzmanlardan bilgi alması ve bu yöndeki davranış değişiklikleri sağlıklı beslenme çabasının bir göstergesidir. Literatürde de beslenme konusunda

uzmanlardan bilgi alan kişilerde ON eğiliminin daha fazla olduğu belirtilmektedir[45]. Sağlık ve sağlıklı beslenme konusundaki bilgi artışı, ortorektik davranışların artmasına neden oluyor gibi görünmektedir.

Araştırmada fiziksel aktivite yapanların, yapmayanlara göre anlamlı düzeyde daha ortorektik oldukları tespit edilmiştir. Bu sonuç yapılan çok değişkenli lojistik regresyonu bulguları tarafından da desteklenmektedir. Günümüzde fiziksel egzersiz ve sağlıklı beslenmenin, optimal sağlığın oluşturulmasında önemli bileşenler olduğu genel bir bilgidir. Ancak optimal sağlığa ulaşmaya odaklanmak takıntılı ve sağlıksız hale gelebilir ve bazı kişiler bu süreçte semptomlar geliştirebilir[30]. Başka bir deyişle, iyi bir fiziksel sağlığa ulaşmayı veya sürdürmeyi amaçlayan bireyler, sağlıklı beslenmeyle işlevsel olmayan düzeyde meşgul olmaya eğilimli olabilir. Yeme bozuklukları, spor ve egzersiz yapan popülasyonda daha sık görülmektedir[65,66]. Bu noktada ON'un fiziksel aktivite düzeyi ile de bağlantılı olması şaşırtıcı değildir[67]. Nitekim ON semptomatolojisi ile fiziksel aktivite sıklığı arasında anlamlı pozitif korelasyonlar bulunduğu bildirilmiştir[68,69]. Buna göre, fiziksel aktivite yapan popülasyonlarda ON'un varlığının araştırılması ve önlenmesine odaklanılması önemli olabilir.

Sonuç ve Öneriler

Yeme bozukluğu olan kişileri içeren örnekler de dahil olmak üzere, farklı popülasyonlarda beden imajı ile sağlıklı beslenmeye yönelik güçlü meşguliyet arasındaki ilişkiyi incelemek ve ortoreksiya eğilimleri ile mükemmeliyetçilik, özsaygı ve öz kontrol gibi faktörler arasındaki ilişkileri daha geniş bir şekilde araştırmak için daha ileri çalışmalara ihtiyaç vardır[13]. Ayrıca ağırlığa dayalı damgalanma, algılanan ayrımcılık ve stres gibi spesifik soruların da dahil edildiği araştırmalar da ON ile ilişkili risk faktörlerini belirlemek üzere faydalı olabilir. Üniversite öğrencileri düzensiz beslenme alışkanlıkları geliştirmeye karşı özellikle savunmasızdır. Bu nedenle ortorektik eğilimlerden kaynaklanan riskleri ve sonuçları daha iyi anlamak için bu grupta daha fazla araştırma yapılması önerilmektedir. Araştırma bulgularına dayanarak, başta kadın öğrenciler olmak üzere üniversite öğrencilerine sağlıklı beslenme ile aşırı takıntılı davranışlar arasındaki farkı öğretmek için eğitim seminerleri düzenlenebilir. Bu eğitimlerde diyetisyen rehberliği olmadan uygulanan diyetlerin riskleri konusunda öğrenciler bilgilendirilebilir. Üniversite danışmanlık merkezleri tarafından ON yaygınlığını izlemek ve risk faktörlerini belirlemek için anketler ve tarama çalışmaları yapılabilir. Bu tür çalışmaların sonuçlarına dayalı olarak öğrencilere özelleştirilmiş müdahale programları sunulabilir. Ayrıca öğrencilere takıntılı düşünce ve davranışlarla başa çıkma becerilerini geliştiren psikoeğitim programları uygulanabilir. Sağlık merkezleri tarafından öğrencilere ücretsiz olarak doğru beslenme uygulamaları, yeme bozuklukları ve ON hakkında bilgilendirici broşürler ve güvenilir çevrimiçi bilgi kaynakları sunulabilir.

Çalışmanın Kısıtlılıkları

Bu çalışmanın bazı sınırlılıkları bulunmaktadır. Öncelikle çalışmada kesitsel bir model kullanılmaktadır. Kesitsel araştırmalar zamansal öncelik ve etkilerin yönleriyle ilgili kesin sonuçlara varılmasına izin vermemektedir. Ayrıca araştırma verilerinin öz bildirimle alınması, bu verilerin objektifliğini etkileyebilir. Mevcut çalışmada üniversite

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öğrencileri örnekleminden veriler elde edilmiştir ve bu nedenle sonuçlar öğrenci olmayan nüfusa genellenemeyebilir. Bununla birlikte bu çalışmanın bazı güçlü yönleri bulunmaktadır. Nisbeten yeni bir olgu olan ON ile ilişkili mekanizmaları anlamak, bu olgunun işlevi ve yaşam kalitesi üzerindeki etkilerini ve klinik müdahaleye yönelik potansiyel hedefleri açıklığa kavuşturmak için önemlidir.

Yazar Katkısı: Fikir/Kavram: TEAZ; Tasarım. TEAZ, KB, TT; Veri İşleme: TEAZ, KB, TT; Analiz/Yorum: KB; Literatür İnceleme: TT Makale Yazımı: TEAZ, KB, TT; Eleştirel İnceleme: TEAZ, KB, TT.

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Effect of Preschool Education on Hand Grip Strength and Functional Skills in Children

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Abstract

Aim: It is thought that whether play-based manual activities performed in preschool education institutions have an effect on children's manual skills, future school life and self-confidence has become an important issue. The aim of this research is to examine the contribution of children who received and did not receive preschool education to hand grip and functional skills and to contribute to the evaluation of personal motor skill characteristics to be determined during this period.

Method: The study included 118 individuals with no physical problems, divided into two groups as children who received preschool education and those who did not. Hand grip strength, finger grip strength and hand functional skills were assessed in both hands, dominant and non-dominant. Participants' hand functional skills were evaluated by measuring the Perdue Pegboard test, key grip strength with the Jamar® hydraulic pinch meter, and gross grip strength with the J-tech® digital hand dynamometer.

Results: As a result of the study, hand and finger grip strength and hand functional skills were found to be higher in children who received preschool education compared to those who did not ($p<0.05$). As a result of the analysis based on the gender of individuals who received preschool education, no statistically significant difference was found between girls and boys ($p>0.05$).

Conclusion: In conclusion, it has been shown that preschool education increases hand grip strength and functional skills in children.

Keywords: Preschool children, hand strength, pinch strength, motor skills.

Okul Öncesi Eğitimin Çocuklarda El Kavrama Gücü ve Fonksiyonel Beceriler Üzerine Etkisi

Öz

Amaç: Çocuklarda okul öncesi eğitim kurumlarında yapılan oyun temelli el aktivitelerinin çocukların el becerilerine, gelecekteki okul hayatına ve özgüvenlerine etkisi olup olmadığının önemli bir konu haline geldiği düşünülmektedir. Araştırılan bu çalışmayla, okul öncesi eğitim alan ve almayan çocukların el kavrama ve fonksiyonel becerilerine katkısını incelemek ve bu dönemde belirlenecek kişisel motor beceri özelliklerinin değerlendirilmesine katkı sağlamak amaçlanmıştır.

Yöntem: Çalışmaya fiziksel olarak herhangi bir problemi bulunmaya 118 birey, okul öncesi eğitim alan ve almayan çocuklar olacak şekilde iki gruba ayrılmıştır. Bireylerde dominant-nondominant her iki el olacak şekilde el kavrama kuvveti, parmak kavrama kuvveti ve el fonksiyonel beceri değerlendirmesi yapılmıştır. Bireylerin el fonksiyonel becerileri Perdue Pegboard testi, anahtar kavrama kuvveti Jamar® hidrolik pinçmetre, kaba kavrama kuvveti J-tech® dijital el dinamometresi ile ölçülerek değerlendirilmiştir.

Bulgular: Yapılan çalışma sonucunda, okul öncesi eğitim alan çocukların almayanlara göre el ve parmak kavrama kuvveti, el fonksiyonel becerileri yüksek bulunmuştur ($p>0.05$). Okul öncesi eğitim alan bireylerin cinsiyeti bakımından yapılan analiz sonucunda kız ve erkek bireyler arasında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p<0.05$).

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ETHICAL STATEMENT: This randomized controlled trial was ethically approved by the Bakırköy Dr. Sadi Konuk Research Hospital Clinical Research Ethics Committee (date: 20.11.2017; protocol no: 2017/365).

Sonuç: Sonuç olarak, okul öncesi eğitimin, çocuklarda el kavrama kuvveti ve fonksiyonel becerileri artırdığı ortaya konmuştur.

Anahtar Sözcükler: Okul öncesi çocuklar, el gücü, parmak kavrama, motor beceriler.

Introduction

Preschool education, which is seen as the first step in people's educational life, is of great importance. Scientific data indicates that preschool education contributes to the child's future development and that the quality of education received during this period is very important. The first years of life are important in terms of cognitive, social and physical change, as many researchers have stated. It is stated that children's success up to the age of 6 accounts for 33% of their total academic success by the age of 18[1].

"Preschool education", which is recognized as the first step of education, includes a period of time in which the physical, psychomotor, emotional, social, mental and language skills, which are important factors in the future lives of children, develop significantly, their sense of self is shaped and the child is in a constant state of change[2,3].

As is known, activities performed in preschool education institutions play a major role in the functional development of a child's hand. From the moment a child enters a preschool education center, they are continuously engaged in activities that involve the use of their hands. Activities performed both individually and in group activities increase the functional capacity of the hand. As children use crayons, scissors, various papers, glue, and tape for their intended purposes in preschool education institutions, and repeatedly engage in similar activities for extended periods, the development of hand muscle strength, finger grip, and fine motor skills becomes inevitable[4].

The functional adequacy of the hand should be considered as a whole encompassing gross grip muscle strength, finger grip strength, fine motor skills and hand-eye coordination. When evaluating the functional developmental capacity of a child's hand, it is necessary to evaluate each one separately and reach the most accurate conclusion about hand function with the inductive method. In addition, one of the first movement patterns that children develop in preschool education institutions is hand-eye coordination. Hand-eye coordination refers to the ability to produce goal-oriented hand activities guided by visual information from the eyes. Good coordination between the sensory-visual system and the musculoskeletal system is necessary for the individual's functionality during interaction with the environment[5].

This study aims to investigate the effects of preschool education on hand muscle strength, finger grip strength and fine motor skills in children and to reveal the benefits of preschool education provided by families during the period when their children are most receptive to development until they start primary school in order to enhance their children's future academic and social success.

Material and Methods

Ethical Considerations

This randomized controlled trial was ethically approved by the Bakırköy Dr. Sadi Konuk Research Hospital Clinical Research Ethics Committee (date: 20.11.2017; protocol no:

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2017/365). All procedures followed the Declaration of Helsinki and written informed consent was obtained from families of all participants.

Participants

First grade students from Istanbul Ahmet Cevdet Paşa Primary School were included in the study. The study initially started with 130 children but continued with 118 children. 12 students were excluded from the study due to exclusion criteria. Inclusion criteria were being between 5.5-7 years old, being in the first grade of primary school, exclusion criteria were having a history of fractures, having a rheumatic disease, and having a history of nerve injury.

Interventions

In our study, firstly, the classes in the school were visited and the students who received preschool education (n=58) and those who did not (n=60) were determined. The students were divided into two groups according to their preschool education status. In the study, hand function was evaluated using hand gross grip, finger grip, and Purdue pegboard fine motor skill tests for both the dominant and non-dominant hands in both groups, and the results were compared.

Outcome Measures

Demographic Information Form

The form consisted of questions regarding the child's age, height, weight, dominant hand, whether they had received preschool education, whether they had a current systemic or rheumatic disease, and whether there was a history of nerve injury or fracture.

Assessment of Hand Grip Strength

In the study, J-tech hand dynamometer was used to determine the hand grip strength, considering the students' ages and physical fitness capacities and the reliability of the study. After the measurement with the dynamometer, the average of the three values obtained was calculated, and these data were used for statistical analysis.

Assessment of Fine Grip Strength of the Hand

In the study, Jamar hydraulic pinchmeter was used to evaluate the finger grip strength of the participants. After the measurement with the pinchmeter, the average of the 3 values obtained was calculated, and these data were used for statistical analysis.

Perdue Pegboard Manual Dexterity Assessment Test

The Purdue Pegboard dexterity test includes washers, rings, and small pegs. The number of items placed in the test is recorded to assess the functional ability of the hand.

Statistical Analysis

SPSS 20.0 package program was used for statistical evaluation. Since the data did not have a normal distribution ($p > 0.05$), non-parametric tests were used. Mann Whitney U test was used to compare the means of two independent groups and Spearman Correlation coefficient was used to test the relationship between two variables. In all analyses, the significance level was given as 0.05. In the power analysis performed using

the G*Power package program, the effect size was taken as 0.5; the significance level was taken as 0.05, and it was concluded that the power was 0.85 with a sample size of 118.

Results

Of the 118 participants in the study, 49.2% were male and 50.8% were female. 49.2% of the children participating in the study received preschool education and 50.8% did not receive preschool education.

Table 1. The demographic and clinical characteristics of the participants.

	Total Participant (n=118)
Gender	
Female	60 (%50,8)
Male	58 (%49,2)
Weight (kg)	27,62±3,85
Height (cm)	137,16±4,39
Age (years)	6,48±0,49
Preschool Education	
Yes	58 (%49,2)
No	60 (%50,8)

Abbreviations: kg: kilograms; cm: centimeter.

The comparison of the hand grip strength (D.H+N.D.H), fine motor skills (D.H+N.D.H), perdue pegboard right+left+both (s) and combination difference values between the experimental and control groups is presented in Table 2. There is a statistically significant difference in the values between the groups (p<0.05). The values of individuals who received preschool education are higher than those who did not.

Table 2. Comparison of values in the assessment of hand grip strength, fine motor skill, between experimental and control groups.

	Experimental Group (n=58) mean±SD	**Control Group (n=60) mean±SD**	**p value**
Hand Grip Strength D.H(kg)	10,52± 1,56	7,89± 1,60	**0,00***
Hand Grip Strength N.D.H (kg)	9,48± 1,72	6,69± 1,65	**0,00***
Pinch Grip Strength D.H(kg)	5,63± 1,15	4,16± 0,99	**0,00***
Pinch Grip Strength N.D.H(kg)	4,36± 0,90	3,20± 1,00	**0,00***
Perdue pegboard right+left+ bilateral (s)	31,63± 3,44	23,55± 2,63	**0,00***
Perdue pegboard both hands together (s)	22,13± 3,32	14,75± 2,75	**0,00***

Data are presented as mean±SD: standart deviation. Abbreviations: kg: kilograms; D.H: dominant hand; N.D.H: non-dominant hand; s: second.

The results of the comparison values of the measurements made on the participants who received preschool education according to gender are presented in Table 3. It has been revealed that there is no statistically significant difference in terms of gender difference in hand grip strength (D.H+N.D.H), fine motor skills (D.H+N.D.H), perdue pegboard right+left+both(s) and combination values of individuals who received preschool education (p>0.05). There is no significant difference between girls and boys in terms of hand grip, fine grip and functional skill test results.

Table 3. Comparison of values in the assessment of handgrip strength, fine motor skill by gender in children attending preschool education

	Male (n=35) mean±SD	Female (n=23) mean±SD	p value
Hand Grip Strength D.H(kg)	10,72 ± 1,62	10,22 ± 1,44	**0,230***
Hand Grip Strength N.D.H (kg)	9,69± 1,76	9,17 ± 1,65	**0,221***
Pinch Grip Strength D.H(kg)	5,56± 1,08	5,73 ± 1,27	**0,429***
Pinch Grip Strength N.D.H(kg)	4,34± 0,76	4,40 ± 1,10	**0,713***
Perdue pegboard right+left+bilateral(s)	31,74± 3,12	31,47 ± 3,94	**0,987***
Perdue pegboard both hands together(s)	22,54± 3,43	21,52 ± 3,13	**0,364***

Data are presented as mean±SD: standart deviation. Abbreviations: kg: kilograms; D.H: dominant hand; N.D.H: non-dominant hand; s: second.

Discussion

The purpose of this study was to examine the relationship between hand grip, finger grip strength, and functional hand skills of children who received and did not receive preschool education. As a result of our study, it was concluded that preschool education has a positive effect on the development of hand grip, finger grip strength and functional hand skills.

The German Child Safety Act has determined the preschool education rights for children. In this context, preschool education is categorized into two groups: under 3 years old and over 3 years old. While communication, attachment and security issues are emphasized for children under 3, language, physical health and physical skills are included for children over 3[6].

Weakness in hand coordination skills is an important individual difference that can affect a child's ability to have self-care skills, writing, academic success, and future career acquisition. Preschool education ensures the development of hand coordination skills and has a positive effect on the child's future achievements.

Ferrariera et al. preferred the Jamar hand dynamometer in their studies on hand grip strength assessment in children and adolescents[7].

There are difficulties in using Jamar hand dynamometer in children due to its weight and hardness. In some studies, dynamometers called Bulb Dynamometers were preferred[8].

In their manual dexterity test study conducted on 1334 children, Gardner et al., described the Purdue Pegboard test as an excellent test that can be use in children[9].

In the light of this information, J-tech hand dynamometer and Purdue pegboard hand dexterity test were used for hand grip and skill tests in this study.

In a study conducted by Surrey et al. in 2001, the key, palmar and fingertip pinch strengths of 414 children (180 boys, 234 girls) between the ages of 5 and 12 were examined, and in another study, the data obtained from the measurement of key pinch strengths of 262 healthy children between the ages of 5 and 12 were found to support the results of the study conducted by Surrey et al. in 2001. When we compare the data in the mentioned studies with the values of the children aged 6-7 in our study, it is revealed that there are similar results with their peers[10,11].

When we look at the study conducted by Yim et al., the key grip values are lower than those in our study, and no significant difference was found between girls and boys in key grip measurement values. Our study also supports the mentioned study[12].

In the study conducted by Tremblay et al. in the Greater Montreal area using the functional manual dexterity test on 267 children (137 girls) aged 3-5, a statistically significant difference was found in the functional dexterity test scores, but no significant difference was found between the genders. Our study also supports the mentioned study[13].

Gardner & Broman published normative data using the Perdue Pegboard Manual Dexterity Test in children and adolescents (671 females and 663 males) aged 5–15 years to guide future studies and set standards for this age group[9].

Desai & Kene in their study stated that the Western population has sufficient purdue pegboard norms and therefore aimed to develop purdue pegboard norms in the Indian population between the ages of 5-65. When the values of individuals are examined, it is found that manual dexterity decreases as age increases and there is no significant difference between boys and girls in manual dexterity test results. Our results are consistent with this study, as the manual dexterity test outcomes for boys and girls in the same age groups were similar, thereby supporting our findings[14].

In a study by Wilson and colleagues, normative data on the Purdue Pegboard were presented based on the performance of 206 right-handed boys and girls aged 2–5 years. Evidence for a dissociation between hand preference and peg-placement efficiency in the younger groups is discussed in light of the results[15].

In a study conducted on primary school children in South Korea, the hand dexterity test measurements of boys and girls were examined, and no significant difference was found between them in terms of hand dexterity. This study also supports these findings[12].

In a study conducted by Case-Smith in 2000, which examined the effects of manual skill practices on hand functional performance and fine motor skills in preschool children, it was stated that after 8 months of regular manual skill practices, the results of children who received preschool education were higher in terms of fine motor and functional performance results. These results support the importance of the therapeutic use of play in intervention[16].

In a study conducted by Chien et al. in 2014 examining the factors that play a role in manual skill performance in the self-care functions of disabled and non-disabled children aged 2-12, they emphasized that children's manual skill performance in real life is a factor that contributes to their self-care functions and that it is necessary to evaluate children's manual skill performance for real-life activities[17]. The results of this study are also parallel.

Conclusion

According to the results of our study, it is revealed that preschool education has a positive effect on the physical development of children. It is seen that making preschool education compulsory will not only positively affect the physical development of children but will also provide many other benefits. Children with good physical development, good manual skills and hand grip strength will be more successful in academic and social activities. To make studies on this subject to be more robust, larger-scale, high-numbered, and multi-center studies are needed. Especially in our country, there is a need for more studies and data that provide information on the average values of children's hand grip and skill test results.

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Psychological Problems in Children with Cerebral Palsy and Its Relationship with Health-Related Quality of Life

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Abstracts

Aim: To investigate the association between psychological problems and health-related quality of life (HRQOL) parameters in children with cerebral palsy (CP).

Method: A convenience sample size of 68 children with CP (mean age: 6.82 years and standard deviation: 1.8; 31 males and 37 females) were recruited in the study. Parent-reported versions of the Strengths and Difficulties Questionnaire (SDQ) and Cerebral Palsy Quality of Life were used to detect the presence of psychological symptoms and HRQOL outcomes in children with CP. Psychological symptoms included emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behavior.

Results: Children with hemiplegic, diplegic, and ataxic CP were mostly found to be in scoring band of close to average on SDQ-Total difficulties Scale (TDS) (SDQ-TDS<14), whereas those with quadriplegic and dyskinetic CP were in very high scoring band (SDQ-TDS >20) on the SDQ-TDS. In terms of association, there were moderate to strong associations between scores for psychological symptoms and HRQOL (r=-0.45 to 0.860).

Conclusion: The results suggest that the nature and extent of mental health problems vary among CP subtypes, with children with tetraplegic and dyskinetic CP more likely to experience mental health symptoms. Given the potential benefits of physical activity on both HRQOL outcomes and psychological mental symptoms, it is essential to encourage children with CP to participate in more physical activities.

Keywords: Cerebral palsy, mental health, psychological symptom, health-related quality of life.

Serebral Palsi'li Çocuklarda Psikolojik Problemler ve Bunun Sağlıkla İlişkili Yaşam Kalitesiyle ile İlişkisi

Öz

Amaç: Serebral palsili (SP) çocuklarda psikolojik sorunlar ile sağlıkla ilişkili yaşam kalitesi (HRQOL) parametreleri arasındaki ilişkiyi araştırmak.

Yöntem: 68 SP'li çocuktan oluşan uygun büyüklükte bir örneklem çalışmaya dahil edildi (ortalama yaş: 6,82 yıl ve standart sapma: 1,8; 31 erkek ve 37 kız). Aile bildirimli Güçler ve Güçlükler Anketi (GGA) ve Serebal Palsi Yaşam Kalitesi (SPYK) SP'li çocuklarda sırasıyla psikolojik semptomların varlığını ve SİYK sonuçlarını belirlemek için kullanıldı. Psikolojik semptomlar, duygusal semptomları, davranışsal problemleri, hiperaktivite/dikkatsizlik, akran sorunları ve sosyal davranışsal sorunları içermekteydi.

Bulgular: Hemiplejik, diplejik ve ataksik SP' li çocuklar çoğunlukla GGA-Toplam Zorluklar Skala (TZS)'da ortalamaya yakın skorlama bandında yer alırken (GGA-TZS<14), kuadriplejik ve diskinetik SP'li çocuklar GGA-TZS'de çok yüksek skorlama bandında yer almışlardır (GGA-TZS>20). Karşılaştırma açısından, psikolojik semptomlar ve SİYK skorları arasında orta-güçlü ilişkiler bulunmuştur (r=-0.45 ila 0.860).

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Sonuç: Sonuçlar, ruh sağlığı sorunları türlerinin ve ciddiyet düzeylerinin SP alt tipleri arasında farklılık sergilediğini ve kuadriplejik ve diskinetik SP'li çocukların ruh sağlığı semptomları yaşama olasılığının daha yüksek olduğunu göstermektedir. Fiziksel aktivitenin hem SİYK sonuçları hem de ruh sağlığı semptomları üzerindeki potansiyel faydaları göz önüne alındığında, SP'li çocukları daha fazla fiziksel aktiviteye katılmaya teşvik etmek önemlidir.

Anahtar Sözcükler: Serebral Palsi, ruh sağlığı, psikolojik semptom, sağlıkla ilişkili yaşam kalitesi.

Introduction

Children with childhood-onset physical disability, including those with cerebral palsy (CP), are at risk of decreased participation[1], pain[2], low levels of physical activity[3], intellectual disability[4], and a number of comorbidities[5], that can negatively affect mental health and health-related quality of life (HRQOL). Additionally, research has demonstrated that depression and anxiety often occur in children with CP[6] and contribute significantly to behavioral and emotional difficulties[7]. This is in line with epidemiological research reporting that mental health disorders are common in the general population[8,9] and that social and physical risk factors further augment the risk of developing mental health disorders[6]. This also corroborates the fact that even people without mental health issues can experience a variety of emotional problems including feelings of exclusion, sadness, and unhappiness[10]. Notably, environmental factors such as bullying[6], negative environmental attitudes, feeling excluded, and other negative social experiences can markedly increase the risk of developing psychological problems[11,12]. Given these facts, it is not surprising that mental health or psychological problems have been reported as frequent comorbidities in children with CP, with a prevalence rate of 35%[13].

According to the World Health Organization (WHO), mental health implies a person's psychological, emotional, and social well-being[10]. Mental health enables individuals to utilize their abilities in accordance with the core values of society. Furthermore, it is essential to note that mental and physical health are intimately interrelated, and children with chronic conditions, such as CP, are particularly vulnerable to developing mental health problems[6]. Furthermore, mental health disorders have been shown to increase the global disease[8]. When untreated, mental health problems can exacerbate comorbidities, physical impairments, and low physical activity levels in this population[14]. This highlights the critical need to address mental health problems. Therefore, gaining a better understanding of mental health disorders in children with CP could enable interventions at an earlier stage. Over the past three decades, several epidemiological and observational studies have investigated mental health disorders in children with CP[6,9,13,15]. In a study by Whitney et al.'s[15], it was found that mobility restriction, sleep disorders, communication problems, pain, and developmental comorbidities accounted for the association between CP and mental health disorders. In another study by Whitney et al.[6] reported that difficulty with friendships and being bullied accounted for psychiatric conditions and behavior/conduct problems in children with CP. Previous research indicates that depression and anxiety are more common among mothers of children with CP than among mothers of typically developing children[16]. Finally, a recent systematic review revealed a scarcity of studies on the prevalence of mental health

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disorders across various subtypes of CP. Therefore, the main aim of the current study was to explore the presence or severity of mental health disorders according to the CP topography. The second aim of this study was to examine the relationship between aspects of mental health disorders and HRQOL.

Material and Methods

Study Design and Participants

This study employed a cross-sectional design, which entailed data collection at a single point in time. Ethical approval for this study was obtained from the Ethical Board for Non-Interventional Scientific Research at Bingöl University (Date: 18/07/2024; No: 24/14). A convenience sample of 68 participants (31 males and 37 females) with their primary caregivers and parents was included in the study. They were recruited from special education and rehabilitation centers in Türkiye's city of Bingöl and received rehabilitation services twice a week in these centers. The inclusion criteria were children diagnosed with different sub-diagnoses of CP based on primary motor impairment (spastic, dyskinetic, and ataxic), aged 4 years and older, and who volunteered to participate in the assessment procedure. The exclusion criteria were children aged less than 4 years as the optimum use of the Communication Function Classification System (CFCS) and Strength and Difficulties Questionnaire for those aged 4 years and older. Additionally, children whose primary caregivers or parents were non-literate or had problems with understanding questions in the questionnaires were excluded. After providing detailed information regarding the study to primary caregivers and parents, informed consent was obtained from the primary caregivers and parents.

Assessments

Classification

The current gross motor function of children with CP was classified using the Gross Motor Function Classification System-Expanded & Revised (GMFCS-E&R), where level I describes higher-level mobility and level V describes lower-level mobility. GMFCS-E&R was derived from the GMFCS by including an age band for youth aged 12 to 18 years. The Turkish version of the GMFC-E&R, which has been shown to be reliable in Turkish children with CP[17], was employed to describe the gross motor function of children. The communication performance of the children in this study was evaluated using the Communication Function Classification System (CFCS), where level I indicates the highest communication performance and level V signifies the lowest communication performance[18]. The Turkish CFCS was used to describe the communication performance of the children with CP in the current study[19].

Measures

Strengths and Difficulties Questionnaire (SDQ): The SDQ is a brief screening tool that is used to determine the probable presence of mental health disorders. The SDQ was designed to detect mental health problems in children aged 4-17 years. It consists of 25 items based on five symptoms: emotional, conduct, hyperactivity/inattention, peer, and prosocial behavior. Items scored as '*Somewhat True'* signify always signified 1. However, the scores for *'Not True'* and '*Certainly True'* varied with the item (0 or 2).

Each subscale score ranges from 0 to 10 if all items are answered. Total difficulties score (TDS) is established by summing all subscale scores, except for the prosocial behavior scale[20]. The externalizing score, which varies between 0 and 20, is the sum of the conduct and hyperactivity scales, whereas the internalizing score, which ranges from 0 to 20, is the sum of the emotional and peer problems scales. The validity and reliability of the Turkish version of the SDQ have been previously described[21]. In the current study, the parent-reported version of the SDQ was used to describe the presence of mental health problems in children with CP. The scoring bands (i.e., cut-off points for SDQ scores) for each SDQ subscale and TDS are presented in Table 2.

Quality of Life Questionnaire for Children (CP QOL-Child): The CP QOL-Child has been established by international research and clinical teams in conjunction with parents and children with CP to describe their quality of life. There are two versions of the CP QOL-Child: self-and primary caregiver proxy reports. In this study, the Turkish CP QOL-primary caregiver proxy report was used to describe the HRQOL of children with CP. It consists of 66 items and seven subdomains: social well-being and acceptance, functioning, participation and physical health, emotional well-being, access to services, pain and impact of disability, and family health[22]. The Turkish CP QOL-Turkish CPQOL-primary caregiver proxy report is a reliable and valid tool for assessing HRQOL in children with CP[23].

Statistical Analysis

Descriptive and correlation statistics were performed using IBM SPSS version 25.0 (SPSS Statistics for Windows, Version 25.0. (IBM Corporation, Armonk, New York, United States) software package program. Descriptive data were summarized using means along with standard deviations and medians with interquartile ranges (IQR) for numerical data, while percentages or rates were used for categorical data. Given that the SDQ score is categorical data, Spearman's correlation, a non-parametric test, was employed to examine the correlations between the SDQ and the CP QOL subdomain scores. Correlation coefficients were interpreted as weak when $r<0.50$, moderate when r was between 0.50 and 0.70, and strong if $r>0.70$. Statistical significance was defined as $p < 0.05$. Stacked bar charts and box-and-whisker plots were generated using Microsoft Excel.

Results

Demographic and clinical features of the participating children were summarized in Table 1. The mean age of the 68 children was 6.82 years (range 4-10 years), with a standard deviation of 1.8, of which 31 (45.6%) were boys and 37 (54.4) were girls. Of the 68 participants, 26 (38.2%) had a diagnosis hemiplegia, 18 (26.5%) with diplegia, 18 (26.5%) with quadriplegia, 2 (2.9%) with dyskinesia, and 4 (5.9%) with ataxia. Regarding gross motor and communication functions, children had GMFCS-E&R and CFCS levels I-V, with the majority classified as levels I-III.

Table 1. Demographic and clinical characteristics of the study participants

Participants with CP (N=68)		
Age (M± SD)	6.82±1.8	
Gender	**n**	**%**
Male	31	45.6
Female	37	54.4
CP Subtype		
Spastic Hemiplegic	26	38.2
Spastic Diplegic	18	26.5
Spastic Quadriplegic	18	26.5
Dyskinetic	2	2.9
Ataxic	4	5.9
Comorbidity (Yes/no)		
Speaking/Communicating	18/50	26.5/73.5
Emotion/Behavioral	20/48	29.4/70.6
Seizure/Epilepsy	9/59	13.2/86.8
Digestion	18/50	26.5/73.5
Sleeping	19/49	27.9/72.1
Repeated Infection	15/53	22.1/77.9
Breathing Problems	9/59	13.2/86.8
Pain	18/58	26.5/73.5
GMFCS-E&R		
Level I	22	32.4
Level II	18	26.5
Level III	10	14.7
Level IV	12	17.6
Level V	6	8.8
CFCS		
Level I	36	52.9
Level II	11	16.2
Level III	14	20.6
Level IV	7	10.3

M, Mean; SD, Standard Deviation; CP, Cerebral Palsy; GMFCS-E&R, Gross Motor Function Classification System-Expanded &Revised; CFCS, Communication Function Classification System.

Psychological Difficulty Domains in Children with CP

Table 2 and Figure 1 show the extent and types of mental health problems experienced by children with different types of CP. According to the current scoring band established for the five psychological dimensions of the SDQ, children with hemiplegic and diplegic CP, as well as those with ataxic CP, were close to the average band with respect to

emotional symptoms and conduct problems, whereas children with quadriplegic and dyskinetic CP were in high and very high bands, respectively. Children with hemiplegic and diplegic CP were found to be within the close to average band for hyperactivity/inattention, while those with quadriplegic, ataxic, and dyskinetic CP were observed to fall within the slightly raised to very high bands. In terms of peer problems, children with hemiplegic and ataxic CP were close to the average band, whereas those with diplegic, quadriplegic, and dyskinetic CP were slightly raised to the very high bands. With regard to prosocial behavior, children with hemiplegic and diplegic CP tended to score in the close to average band, whereas children with quadriplegic and dyskinetic CP tended to score in the very high band.

Table 2. Extent and type of psychological problems experienced by cp subtypes

SDQ Domains	Hemiplegic (n=26) Median (IQR)	Diplegic (n=18) Median (IQR)	Quadriplegic (n=18) Median (IQR)	Ataxic (n=4) Median (IQR)	Dyskinetic (n=2) Median (IQR)
Emotional Symptoms	3 (0-8)	4 (0-9)	7 (1-10)	2,5 (0-7)	8 (7-9)
Conduct Problems	2 (0-5)	2 (0-6)	8 (0-10)	1 (0-2)	5 (4-6)
Hyperactivity /Inattention	3 (0-6)	3.5 (0-10)	8 (1-10)	6 (3-9)	7.5 (6-9)
Peer Problems	2 (0-5)	3.5 (0-7)	8 (0-10)	2 (0-6)	6 (4-8)
Prosocial Behavior	9 (3-10)	7 (1-10)	2 (0-10)	5 (3-10)	2.5 (2-3)

Banding of SDQ-Subscale Scores: **Emotional Symptoms;** 0-4 close to average, 5 slightly raised, 6 high, and 7-10 very high; **Conduct problems**; 0-3 close to average, 4 slightly raised, 5 high, and 6-10 very high; **Hyperactivity /Inattention;** 0-5 close to average, 6 slightly raised, 7 high, and 8-10 very high; **Peer problems**; 0-2 close to average, 3 slightly raised, 4 high, and 5-10 very high; **Prosocial Behavior;** 7-10 close to average, 6 slightly raised, 5 high, and 0-4 very high; IQR: Interquartile Range

Figure 1. Stacked bar charts showing extent and type of psychological problems experienced by cerebral palsy subtypes
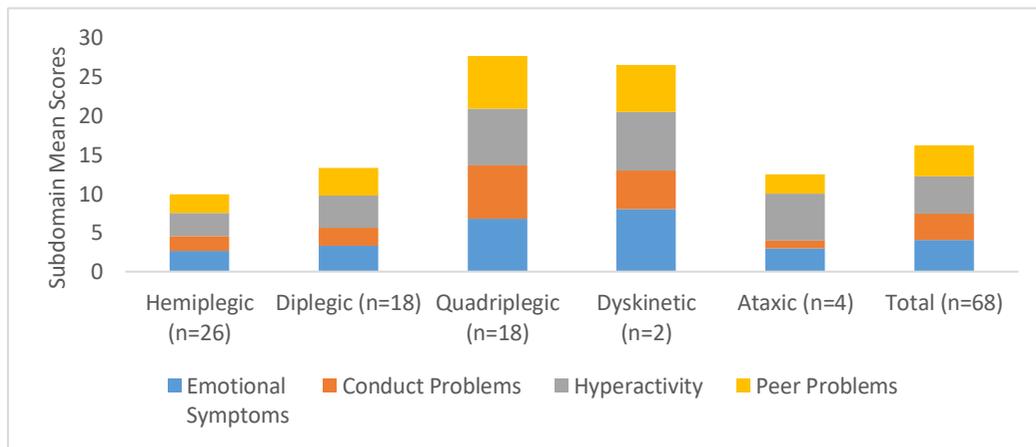
Total Difficulties, Externalizing, and Internalizing Scores

As summarized in Table 3 and illustrated in Figures 2 and 3, children with hemiplegic, diplegic, and ataxic CP were classified within the close to average difficulty band, whereas those with quadriplegic and dyskinetic CP were categorized within the very high difficulty band. We were unable to classify the mental health status of children based on internalizing and externalizing scores since there are no established cut-off points for these categories. However, the internalizing and externalizing scores of children with quadriplegic and dyskinetic CP were significantly higher than those of children with hemiplegic, diplegic, and ataxic CP.

Table 3. SDQ- Total difficulties, internalizing, and externalizing scores of children with different subtypes of cerebral palsy

SDQ Scores	Hemiplegic (n=26) Median (IQR)	Diplegic (n=18) Median (IQR)	Quadriplegic (n=18) Median (IQR)	Ataxic (n=4) Median (IQR)	Dyskinetic (n=2) Median (IQR)
Total Difficulties Score	10.5 (0-21)	12.5 (5-27)	31 (3-36)	13.5 (7-16)	26.5 (26-27)
Internalizing Score	5 (0-12)	7 (1-16)	15.5 (2-19)	6.5 (2-7)	14 (13-15)
Externalizing Score	5 (0-9)	5 (3-13)	15,5 (1-20)	7 (5-9)	12.5 (12-13)

SDQ: Strengths and Difficulties Questionnaire; IQR: Interquartile Range; Banding of SDQ-Total Difficulties Score: 0-14 close to average, 15-17 slightly raised, 18-19 high, and 20-40 very high

Figure 2. Stacked bar charts showing the severity of psychological problems among children with different CP subtypes based on SDQ Total Difficulties, Externalizing and Internalizing scores
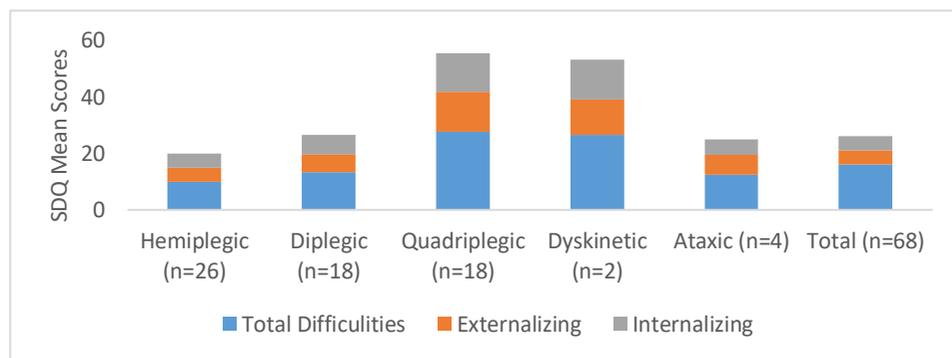
Figure 3. Box and whisker plots of SDQ- Total Difficulties, Internalizing, and Externalizing scores
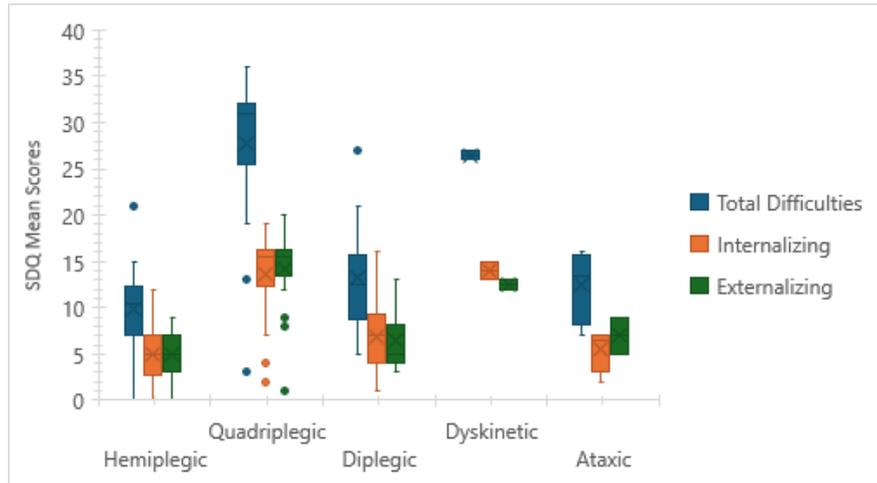
Association Between Psychological Problems and Health-Related Quality of Life

The SDQ-Prosocial Behavior scale and CP QOL subdomains showed moderate to very strong relationships (r=0.482 to 0.860), with exception of CP QOL- "*Pain and Impact of Disability*" subdomain (r=0.107). The associations between SDQ-Total Difficulties and CP QOL subdomain scores ranged from -0.493 to-0.625 (moderate to strong relationships). SDQ-Internalizing Score was significantly correlated with CP QOL subdomains (r=-0.45 to -0.75), except for "*Participation and Physical Health*" and "*Pain and Impact of Disability*" subdomains. That is, the SDQ-Internalizing Score exhibited an insignificant and weak relationship with the CP QOL- "*Participation and Physical Health*" and "*Pain and Impact of Disability*" subdomains (r_1 -0.127 and r_2=-0.192, p>0.05). The SDQ-Externalizing Score was found to be moderately to very strongly correlated with all subdomains of the CP-QOL, with correlation coefficients ranging from -0.416 to -0.810, except for the subdomain "*Feelings About Functioning*" (r=-0.038).

Table 4. Spearman correlation of psychological problems and health related quality of life

SDQ Scores	Cerebral Palsy Quality of Life (CP QOL)				
	Social Wellbeing and Acceptance	Functioning	Participation and Physical Health	Emotional Wellbeing	Pain and Impact of Disability
Prosocial Behavior	0.683*	0.482*	0.763*	0.860*	0.107**
Total Difficulties	-0.493*	-0.565*	-0.551*	-0,625*	-0.601*
Internalizing Score	-0.45*	-0.75*	-0.127**	-0.68*	-0.192**
Externalizing Score	-0.538*	-0.038**	-0.810*	-0.416*	-0.734*

SDQ: Strength and Difficulties Questionnaire; *: p<0.05; **: p>0.05; Note that correlation is significant at the 0.05 level

Discussion

This study found that a substantial proportion of children with CP were at risk of developing mental health disorders, with those with quadriplegic and dyskinetic CP having higher rates of developing mental health disorders. More children with quadriplegic and dyskinetic CP reported emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behavior problems than those with hemiplegic, diplegic, and ataxic CP. Collectively, children with hemiplegic, diplegic, and ataxic CP scored in the close to average band on SDQ-Total Difficulties Scale (SDQ-TDS), whereas those with quadriplegic and dyskinetic CP scored in the very high band on SDQ-TDS, confirming the results for mental health subdomains. However, due to the small number of children with ataxic and dyskinetic CP in this study, the results regarding mental health associated with these subtypes of CP cannot be generalized. With regard to associations, most of the mental health and HRQOL subdomains were found to be significantly correlated with each other.

As reported by a recent systematic review, nearly one-third of children with CP experienced mental health symptoms as measured by the SDQ[13], with rates varying across studies. More specifically, a study conducted by Parkes et al.[12] reported that children with CP mostly experienced peer problems, followed by hyperactivity and emotional symptoms. A previous epidemiological study by Goodman et al. in 1996[24] have shown that mental health problems are frequent in children with hemiplegic CP. In contrast, the results of the current study showed that children with hemiplegic CP are likely to have fewer mental health problems. The subdomain scores of the mental health of children with hemiplegia were found to be similar to the normative data reported in a study of a national population sample of children and adolescents in the US[25]. This can be explained by the fact that rehabilitation strategies to improve social and physical risk factors in children with CP that are closely related to poorer mental health[15] have advanced over the last three decades[26-28]. Modern rehabilitation strategies for children with CP adopt a comprehensive strategy that integrates physical, occupational, and speech-language therapies alongside psychological and social support. That is, modern rehabilitation strategies prioritize social inclusion and engagement in activities, as these play a vital role in mental well-being. Involvement in social interactions and minimizing experiences of bullying have been found to alleviate mental health problems in children with CP[6]. Studies' findings demonstrated that children with quadriplegic and dyskinetic CP had a greater risk of developing mental health disorders than those with hemiplegic, diplegic, or ataxic CP. This may be attributed to the fact that quadriplegic and dyskinetic CP are closely related lower mobility level[29], pain[30,31], decreased HRQOL[32,33], and severe physical risk factors[32,34]. These variables have been shown to increase the risk of developing mental health disorders in children with CP[12,15]. Despite having lower mobility level[35], it was found that children with ataxic CP in the current study scored mostly close to average or slightly raised bands on both SDQ-TDS and SDQ-subdomains. The reason for this could be the limited number of children with ataxic CP included in the present study. Therefore, findings related to the mental health outcomes of children with ataxic CP are not generalizable.

The results showed a significant relationship between scores on the SDQ and HRQOL subdomains, except for weak or negligible associations between some dimensions (e.g., between SDQ-*Prosocial Behavior* and CP QOL- *Pain and Impact of Disability*). This was expected, since mental health has been previously reported to be a significant determinant of HRQOL in children with CP[36]. Furthermore, mental health has been demonstrated to be a crucial factor that significantly affects the participation of children with CP[37], which is directly associated with HRQOL[36]. More specifically, it was revealed that the prosocial behavior domain of mental health is an important factor in a child's social well-being, emotional well-being, and participation in different life situations. Surprisingly, although pain in children with CP has been reported to negatively influence their social functioning and participation[6-15], the present study found only weak or negligible associations between SDQ-*Prosocial Behavior* and CP QOL- *Pain and Impact of Disability* subdomains. Since evidence on the direct association between SDQ-Prosocial Behavior and CP QOL-Pain and Impact of Disability is limited, we could not explain this discrepancy. Therefore, future research should explore the direct relationship between these variables. Our findings further showed that the SDQ-externalizing score, sum score of conduct, and hyperactivity scales, were closely related to HRQOL aspects of social well-being and acceptance, participation, emotional well-being, and impact of disability. The results of each relationship between HRQOL and mental health suggest that mental health is a critical factor in improving HRQOL in children with CP. In light of the established benefits of physical therapy[38] and family-centered interventions[39] on mental health, and the well-documented link between mental health and health- HRQOL, addressing mental health concerns in children with cerebral palsy through evidence-based and targeted approaches is of critical importance.

In the present study, only two (2.9%) and four (5.9%) children with CP were diagnosed with dyskinetic and ataxic CP, respectively. This limited the generalizability of the mental health results associated with these CP subtypes. This may be one of the limitations of this study. Second, some participants in the study presented with one or more comorbid conditions, which may have influenced their mental health and HRQOL. However, examining the impact of comorbidities on mental health was beyond the scope of the present study and may warrant investigation in future research. Therefore, future research is needed to investigate mental health status across CP subtypes by including a larger number of individuals with each CP subtype.

Conclusion

The findings of the current study suggest that the presence or severity of mental health problems varies among CP subtypes, with hemiplegic and diplegic CP, the mildest form of CP, being less likely to develop mental health problems. Moreover, mental health and HRQOL subdomains were closely related to each other. Given that mental health is a crucial determinant of participation in children with cerebral palsy (CP), as highlighted in the previous literature, and is closely related to their overall well-being, it is imperative to address mental health in this population. In conclusion, considering the potential benefits of physical activity and family-focused interventions on both HRQOL and psychological mental symptoms, it is essential to encourage children with CP to participate in more physical activities.

Ethical Statement: Ethical approval to conduct the current study was obtained from the Ethical Board for Non-Interventional Scientific Research at Bingöl University (No: 24/14 and date: 18.07.2024).

Consent to Participate in the Study: After providing detailed information regarding the study to primary caregivers and parents, informed consent was obtained from the primary caregivers and parents.

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The Relationship between Depression/Anxiety and Food Service Satisfaction in Hospitalized Patients

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Abstract

Aim: Mental conditions and food service satisfaction significantly affect dietary intake in hospitalized patients. However, research on this interaction is scarce. Therefore, this study had two objectives: i) determining the relationship between anxiety/depression and food service satisfaction and ii) testing the direct or indirect relationship between depression and daily energy intake mediated by food service satisfaction.

Method: This cross-sectional study was conducted in a public hospital. The sample comprised 218 adult inpatients (18-75 years of age). Data were collected using the Hospital Anxiety Depression Scale (HADS) and the Acute Care Hospital Food Service Patient Satisfaction Questionnaire (ACHFSPSQ). Dietary intake was analyzed based on 24-hour recall data. The data were analyzed using path analysis.

Results: Participants who were at risk for depression and anxiety had significantly lower mean ACHFSPSQ subscale scores than those who were not ($p<0.05$). There was a positive correlation between ACHFSPSQ subscale scores and daily energy and nutrient intake ($p<0.05$). However, participants who were at risk for anxiety and depression did not consume significantly less energy and nutrient than those who were not ($p>0.05$). The results showed that the risk for depression adversely affected food service satisfaction ($p<0.05$). However, it had no direct or indirect relationship with daily energy intake ($p>0.05$). The results also showed that food service quality partly mediated the risk for depression and daily energy intake ($\beta=6.003$, $p<0.05$).

Conclusion: Patients at risk for anxiety and depression may have negative perceptions of food services that are not reflected in their actual dietary intake. Therefore, healthcare professionals should consider hospitalized patients' mental status before assessing their satisfaction with food services.

Keywords: Anxiety, depression, energy intake, food service, inpatients.

Hastanede Yatan Hastalarda Depresyon/Anksiyete ile Yiyecek Hizmeti Memnuniyeti Arasındaki İlişki

Öz

Amaç: Psikolojik durum ve yiyecek hizmetleri memnuniyeti, hastanede yatan hastalarda besin alımı üzerinde önemli bir etkiye sahiptir. Ancak, bu faktörlerin etkileşimi bilinmemektedir. Bu nedenle çalışmanın amaçları: i) anksiyete ve depresyon riski ile yemek servisi memnuniyeti arasındaki ilişkiyi belirlemek, ii) depresyon riski ile günlük enerji alımı arasındaki doğrudan ve dolaylı ilişkiyi, yemek servisi memnuniyeti alt boyutları aracılığıyla test etmektir.

Yöntem: Bu çapraz-kesitsel çalışma, bir kamu hastanesinde yürütülmüştür. Örneklem 218 yatan hastadan olşmaktadır (18-75 yaş arası). Veriler Hastane Anksiyete Depresyon Ölçeği (HADS) Hastane Yiyecek

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Hizmetleri Hasta Memnuniyeti Ölçeği (ACHFSPSQ) kullanılarak toplanmıştır. Diyet alımı 24 saatlik hatırlatma yöntemiyle analiz edilmiştir. Veriler Path analizi kullanılarak analiz edilmiştir.

Bulgular: Depresyon ve anksiyete riski olan hastaların ACHFSPSQ alt puanları risk altında olmayanlara göre önemli ölçüde daha düşüktü (p<0,05). ACHFSPSQ alt puanları günlük enerji ve çoğu besin ögesi alımıyla pozitif ilişkiliydi (p<0,05). Ancak anksiyete ve depresyon riski olan hastalarla risk olmayanlar arasında enerji ve besin ögesi alımı açısından istatistiksel olarak anlamlı bir farklılık yoktu (p>0,05). Sonuçlar depresyon riskinin yiyecek hizmetleri memnuniyeti üzerinde olumsuz bir etkisi olduğunu gösterdi (p<0,05). Ancak depresyon riski ile günlük enerji alımı arasında doğrudan ve dolaylı bir ilişki bulunamadı (p>0,05). Bulgular ayrıca yemek servisi kalitesi alt puanının depresyon riski ve günlük enerji alımı arasındaki ilişkiye kısmen katkısı olduğunu gösterdi (β=6,003, p<0,05).

Sonuç: Anksiyete ve depresyon riski olan hastaların yiyecek hizmetleri ile ilgili olumsuz düşünceleri gerçek besin alımlarına yansımayabilir. Bu yüzden sağlık profesyonelleri yatan hastalarda yiyecek hizmetleri memnuniyetini değerlendirmeden önce hastaların psikolojik durumunu dikkate almalıdır.

Anahtar Sözcükler: Anksiyete, depresyon, enerji alımı, yiyecek servisi, yatan hastalar.

Introduction

The prevalence of malnutrition among hospitalized adults in Türkiye is more than 15% and increases dramatically after a one-week hospital stay[1,2]. Malnutrition is positively correlated with longer hospital stays and higher morbidity, mortality, and costs. Therefore, healthcare professionals should ensure that their patients get enough food intake[3,4]. Food intake during hospitalization is influenced by both the patient's condition and the quality of hospital meals. The patient's condition encompasses physical characteristics (e.g., difficulty eating and swallowing, poor dentition, and reduced senses of taste and smell) and psychosocial factors (e.g., anxiety, sadness, and loneliness). In addition, nutrition-related factors are abdominal bloating, diarrhea, nausea, vomiting, fatigue, and loss of appetite. Diet restrictions and interruptions during mealtime are other possible factors[5,6].

The prevalence of depression and anxiety among hospitalized patients ranges from 20% to 50%. Patients with longer hospital stays are more likely to experience anxiety and depression[7,8], which in turn leads to a dramatic loss of appetite[9]. Research also shows that older adults suffering from depression and anxiety tend to have a decreased appetite and lower food intake[10,11].

Hospital food services are a complicated system that affects patients' food intake. Patients' satisfaction with food services increases as the quality of the services improves. In this interaction, the most important factor is food quality[12]. Recognition of staff and the quality of service interactions are also key predictors of patient satisfaction[13]. Research shows that hospitalized patients who are more satisfied with food services get more energy and protein intake[14,15-17].

Anxiety, depression, and satisfaction with food services are significant factors influencing the food and energy intake of hospitalized patients. However, only a small body of research investigates the relationship between those factors. Moreover, we do not know whether patients' dissatisfaction with food services due to depression affects their energy intake. Therefore, this study first investigated the relationship between anxiety, depression, and food service satisfaction and then tested the direct or indirect

association between depression and daily energy intake mediated by food service satisfaction.

Material and Methods

Design

A power analysis (G-power) was performed to calculate the sample size (Mann Whitney U test was used). The results showed that a sample of 188 to 220 would be large enough to detect significant differences (an effect size of 0.36, the alpha value of 0.05, and the theoretical power of 80% and 85%). Between November 2019 and March 2020, 300 hospitalized patients aged 18-75 years were recruited from a public hospital in Ankara/Turkiye.

The inclusion criteria were: (1) volunteering, (2) having been hospitalized for at least one week, (3) having at least one meal (breakfast, lunch, and dinner) provided by the hospital, and (4) not undergoing enteral or parenteral nutritional support. We excluded patients who consumed at least one meal outside the hospital because our goal was to detect 24h food consumption in the hospital. We also excluded patients who reported severe pain. Therefore, the final sample consisted of 218 patients. Participants were recruited from the general surgery, neurology, cardiology, burns, gastroenterology, internal diseases, endocrinology, infection, and physical therapy units of the hospital. More than half of the participants suffered from chronic diseases. We ignored drug interactions because most participants were on multiple medications. Informed consent was obtained from all participants. The research adhered to the guidelines of the Declaration of Helsinki. The study was approved by the Ethics Committee of Karamanoğlu Mehmetbey University (Approval date/ no: 17.10.2019-E.29397). The results were reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist. The data were collected through face-to-face interviews

Data Collection Tools

Survey Form

The researcher developed the survey form. It consisted of three items on demographic characteristics (age, duration of hospital stay, and the status of chronic illness), and the amount of meals consumed, the most important factor for meals, thoughts about medical nutrition therapy, etc.

Acute Care Hospital Food Service Patient Satisfaction Questionnaire (ACHFSPSQ): The Acute Care Hospital Food Service Patient Satisfaction Questionnaire (ACHFSPSQ) was developed by Capra et al.[18] and adapted to Turkish by Ercan and Ok[19]. It consists of 21 items rated on a five-point Likert-type scale ("1 = Never" to "5 = Always"). It has four subscales: food quality, meal service quality, staff/service issues, and the physical environment. The subscales have no cut-off points. Higher scores indicate more satisfaction. The questionnaire has an extra item that asks the respondent to rate the food service on a scale of "very poor" to "very good." The Turkish version comprises 20 items and five subscales: food quality (items from 1 to 6), meal service

quality (items from 7 to 11), hunger and quantity (items from 12 to 14), staff/service issues (items from 15 to 18) and physical environment (items 20 and 21).

Hospital Anxiety Depression Scale (HADS): The Hospital Anxiety Depression Scale (HADS) was developed by Zigmond and Snaith (1983)[20] and adapted to Turkish by Aydemir et al. (1997).[21] The instrument consists of 14 items rated on a four-point ordinal scale (from 0 to 3). It has two subscales: anxiety (seven items) and depression (seven items). The total score ranges from 0 to 21, with higher scores indicating a higher risk for anxiety and depression. The subscales "anxiety" and "depression" have the cut-off points of 10 and 7, respectively.

Hospital Menu: The hospital operates a kitchen with a conventional cook-serve system, featuring centralized tray assembly and hot-trolley delivery. The menu follows a non-selective, one-month cycle, ensuring variety without repetition. It consists of a four-course set menu, including soup, an entrée (such as rice or pasta), a main dish, and a side dish (e.g., salad, dessert, fruit, or yogurt). Occasionally, the same meals are served for both lunch and dinner.

Anthropometric Measurements

Body weight was measured by health professionals to the nearest 0.1 kg. Height to the nearest 0.1 cm was measured with a stadiometer. Body Mass Index (BMI) was calculated by dividing weight (in kilograms) by the square of height (in meters) [22].

Dietary Assessment

Dietary data were gathered through a 24-hour food recall. A Food and Nutrition Photograph Catalogue was used to estimate the quantity of foods consumed[23]. Energy, macronutrient, and micronutrient contents were analyzed using the Nutrition Information System [Beslenme Bilgi Sistemi (BeBIS)] [24]. The daily consumption of food groups, including dairy, protein sources, grains, fruits, and vegetables, was also calculated using BEBIS.

Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS, IBM, v. 22) and Analysis of Moment Structures (AMOS) at a significance level of 0.05. The Chi-square test was used to assess the relationship between anxiety/depression and thoughts about meals and dieting items. The student t-test (for parametric variables) and the Mann-Whitney U test (for non-parametric variables) were used to detect the relationship between anxiety/depression and food groups, daily energy and nutrient intake, and food service satisfaction. The path model examined the direct or indirect association between depression and meal consumption statement, food quality, meal service quality, hunger and quantity, staff/service issues, physical environment, and daily energy intake

Results

The sample consisted of 113 men and 105 women. Participants had a mean age of 49.47±12.9 years (18-75). Most participants had been hospitalized for one week to one month (Table 1).

Table 1. Demographic Characteristics (N=218)

	n	%
Gender		
Man	113	51.8
Woman	105	48.2
Age (year)		
≤40	60	27.5
>40	158	72.5
Duration of hospital stay		
1 week-1 month	194	89.0
>1 month	24	11.0
Chronic disease		
Yes	126	57.8
No	92	42.2
Risk for Anxiety		
Yes	56	25.7
No	162	74.3
Risk for Depression		
Yes	123	56.4
No	95	43.6

Participants who were at risk for anxiety and depression had significantly fewer meals than those who were not (p<0.05). However, there was no significant difference in BMI levels between participants who were at risk for anxiety and depression and those who were not. Moreover, participants who were informed by dietitians about their medical nutrition therapy were at a higher risk for anxiety than those who were not (Table 2).

Table 2. Distribution of Thoughts about Meals and Dieting by Anxiety (HAD-A) and Depression (HAD-D) (N=218)

	Risk for Anxiety n (%)		Risk for Depression n (%)	
	No	**Yes**	**No**	**Yes**
Meal consumption				
All	50 (73.5)	18 (26.5)	34 (49.3)	34 (50.0)
More than half	69 (84.1)	13 (15.9)	42 (51.2)	40 (48.8)
Half	43 (63.2)	25 (36.8)	19 (27.9)	49 (72.1)
	p=0.014		p=0.007	
Most important factor for meals				
Good smell	12 (63.2)	7 (36.8)	5 (25.0)	14(75.0)
Proper serving temperature	11 (55.0)	9 (45.0)	7 (35.0)	13 (65.0)
No repetition of meals	21 (70.0)	9 (30.0)	8 (26.7)	22 (73.3)

Good appearance	22 (75.9)	7 (24.1)	15 (51.7)	14 (48.3)
Good taste	96 (80.0)	24 (20.0)	60 (50.0)	60 (50.0)
	p>0.05		p>0.05	
Were you informed by your dietitian about your medical nutrition therapy?				
Yes	85 (66.9)	42 (33.1)	50 (39.4)	77 (60.6)
No	77 (84.6)	14 (15.4)	45 (49.5)	46 (50.5)
	P=0.003		p>0.05	
Do you think your nutritional therapy helps cure your illness?				
Yes	114 (71.3)	46 (28.7)	71 (44.4)	89 (55.6)
No	48 (82.8)	10 (17.2)	24 (41.4)	34 (58.6)
	p>0.05		p>0.05	
Body Mass Index[a]	24.4 (6.1)	25.88 (4.6)	25.5 (5.5)	25.57 (4.5)
	p>0.05		p>0.05	

Chi-square test was used for categorical variables.

[a]Student t-test was used for BMI comparison

Participants who were at risk for depression had significantly lower ACHFSPSQ subscale scores than those who were not ($p<0.05$). Moreover, participants who were at risk for anxiety had significantly lower "food quality," "hunger and quantity," and "physical environment" subscale scores than those who were not ($p<0.05$) (Table 3).

Table 3. Distribution of ACHFSPSQ subscale scores by anxiety (HAD-A) and depression (HAD-D)

	Risk for Anxiety			**Risk for Depression**		
	Yes	**No**	**_p_**	**Yes**	**No**	**_p_**
	Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	
Food quality	18 (5)	20 (5)	0.008	18 (5)	20 (5)	<0.001
Meal Service Quality	20 (4.8)	20 (6)	>0.05	20 (5)	22 (5)	<0.001
Hunger and Quantity	10 (4)	10.5 (3)	0.03	10 (3)	11 (3)	0.010
Staff/Service issues	15 (4)	16 (5)	>0.05	16 (5)	17 (5)	<0.001
Physical Environment	6 (2)	8 (4)	0.001	7 (3)	8 (4)	<0.001

Mann-Whitney U test was used

There was a positive correlation between ACHFSPSQ subscale scores and daily energy, protein, animal protein, fat, riboflavin, niacin, vitamin B12, and iron intake ($p<0.05$) (Table 4).

Table 4. Distribution of Energy and Nutrient Intake by ACHFSPSQ subscale scores

Nutrients	Food Quality	Meal Service Quality	Hunger And Quantity	Staff/ Service Issues	Physical Environment
Energy (kcal)	0.188**	0.198**	0.159*	0.167*	0.221**
Protein (g)	0.199**	0.239**	0.227*	0.230**	0.203**
Animal protein	0.166**	0.208**	0.218**	0.217**	0.175**
Carbohydrate (g)	0.078	0.096	0.107	0.004	0.109
Fat (g)	0.242**	0.228**	0.172*	0.256**	0.271**
Cholesterol	0.173*	0.230**	0.214**	0.248**	0.258**
Vit. A (mg)	0.008	0.116	0.184*	0.069	0.145*
Riboflavin (mg)	0.205**	0.204**	0.175**	0.185**	0.176**
Niacin (mg)	0.193**	0.230**	0.197**	0.242**	0.196**
Vit.B6 (mg)	0.198**	0.086	0.110	0.087	0.047
Folate (mg)	0.078	0.024	0.074	-0.027	-0.036
Vit.B12 (mg)	0.172*	0.147*	0.182**	0.141*	0.175**
Magnesium(mg)	0.205**	0.163**	0.072	0.123*	0.094
Iron (mg)	0.214**	0.187**	0.117*	0.163**	0.125*
Zinc (mg)	0.250**	0.243**	0.147*	0.228**	0.178**
Fiber (g)	0.145*	0.145*	0.061	0.028	0.053

Spearman's correlation test was used.

* $p<0.05$ and **$p<0.01$

There was no significant difference in dairy, protein, grain, vegetable, and fruit intake between participants who were at risk for anxiety/depression and those who were not ($p>0.05$). Moreover, there was no significant difference in daily macronutrient and micronutrient intake between participants who were at risk for depression and those who were at risk for anxiety ($p>0.05$) (Table 5).

Table 5. Distribution of daily food group and energy and nutrient intake by anxiety (HAD-A) and depression (HAD-D)

	Risk for Anxiety			Risk for Depression		
	Yes	**No**	**p**	**Yes**	**No**	**P**
	Median (IQR)	Median(IQR)		Median (IQR)	Median(IQR)	
Daily Food Group (portions)						
Dairy	2.3 (1.4)	2 (1.1)	>0.05	2 (1.3)	2 (1.3)	>0.05
Protein foods	1.24 (1.6)	1.35 (1.1)	>0.05	1.34 (1.2)	1.31 (1.1)	>0.05
Grains	4.79 (2.4)	4.7 (3.4)	>0.05	4.78 (3.3)	4.69 (2.7)	>0.05
Fruits	1.61 (2.3)	1.03 (1.2)	>0.05	1.25 (1.9)	1 (1.1)	>0.05
Vegetables	2.09 (2.8)	1.9 (2.4)	>0.05	2 (2.8)	1.87 (2.3)	>0.05
Daily Energy and Nutrient Intake						
Energy (kcal)	1586.8 (717.6)	1501.5(735.8)	>0.05	1513.8 (752.2)	1529.7 (687.6)	>0.05

Protein (g)	67.3 (24.5)	66.5 (27.3)	>0.05	61.9 (27.9)	67.6 (26.9)	>0.05
Animal protein	34.6 (20.8)	35.6 (20.7)	>0.05	33.4 (20.4)	37.6 (19.9)	>0.05
Carbohydrate(g)	196.9 (91.3)	169.4 (101.7)	>0.05	176.6 (101.6)	169.2 (97.8)	>0.05
Fat (g)	60.3 (32.3)	62.8(33.5)	>0.05	59.3 (34.5)	65.6 (29.7)	>0.05
Vit. A(mg)	611.5 (511.9)	716.7 (662.9)	>0.05	683.5 (564.7)	645.7 (723.1)	>0.05
Thiamine (mg)[a]	0.87±0.3	0.86±0.3	>0.05	0.85±0.3	0.88±0.4	>0.05
Riboflavin (mg)	1.56 (0.7)	1.47 (0.8)	>0.05	1.47 (0.8)	1.54 (0.7)	>0.05
Niacin (mg)	23.9 (9.4)	24.9 (9.7)	>0.05	24.2 (10)	25.7 (9.4)	>0.05
Vit.B6 (mg)	1.33 (1)	1.28 (0.8)	>0.05	1.31 (0.9)	1.24 (0.8)	>0.05
Folate (mg)	296.9 (236.4)	311.1 (219.4)	>0.05	317.3 (199.6)	298.9 (224.4)	>0.05
Vit.B12 (mg)	4.2 (3.3)	3.9 (3.6)	>0.05	4.2 (3.3)	4.3 (3.9)	>0.05
Magnesium[a](mg)	273.1 ± 97.9	260.5± 90.8	>0.05	267.8±95.8	258.4± 88.4	>0.05
Iron (mg)	8.3 (4.7)	8.4 (4.5)	>0.05	8.3 (4.7)	8.5 (4.4)	>0.05
Zinc	9.4 (5.2)	8.8 (4.2)	>0.05	8.9 (4.8)	8.8 (4.3)	>0.05
Fibre	22 (11.2)	21.3 (12.4)	>0.05	22.2 (10.9)	20.4 (13.3)	>0.05

Mann-Whitney U test was used

[a] Mean± SD; Student t-test was used

The path model showed that the risk for depression (HAD-D) was negatively associated with ACHFSPSQ subscale scores; food quality (β= -1.98 $p<0.05$), meal service quality (β=-0.81, $p<0.05$), hunger and quantity (β=-1.39, $p<0.05$), staff/service issues (β=-1.008, $p<0.05$), and physical environment (β=-61.41, $p=0.05$). However, the risk for depression (HAD-D) was not significantly associated with meal consumption statements (β=-2.30, $p>0.05$). Furthermore, the ACHFSPSQ "meal service quality" subscale scores were significantly related to daily energy intake (β=6.003, $p<0.05$). The path model indicated that the risk for depression did not predict daily energy intake indirectly, except for the small contribution of meal service quality (Figure 1).

Figure 1. Path analysis
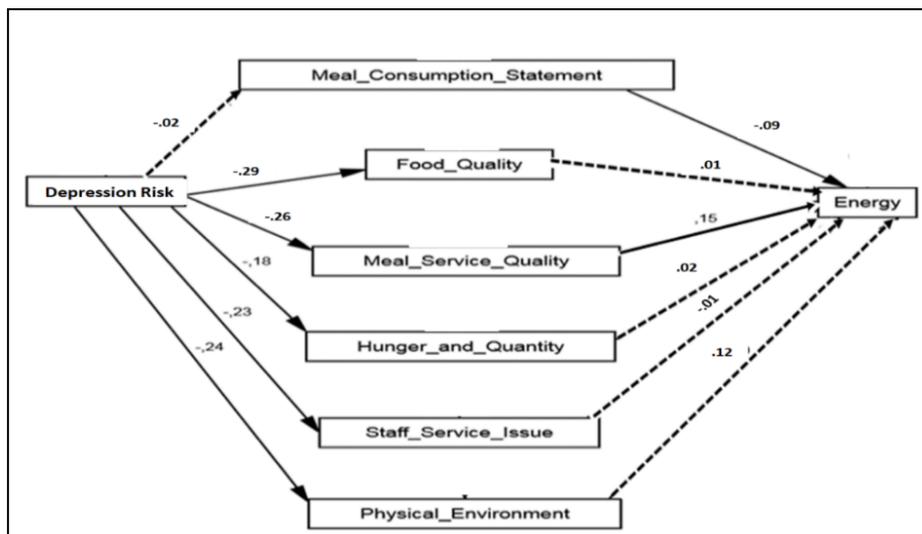
Dashed lines indicate non-significant paths

Discussion

This study first investigated the relationship between anxiety/depression and food service satisfaction. Second, it examined the direct or indirect association between depression and daily energy intake mediated by food service satisfaction.

Depression is more prevalent among medically ill individuals than in the healthy population[25]. Results showed that one in four hospitalized patients was at high risk for anxiety (26.0%), while more than half of hospitalized patients were at high risk for depression (56.6%). Research shows that the prevalence of anxiety and depression ranges from 38% to 61% and 21% to 54%, respectively[7,8,26]. Hospitalized patients who suffer from chronic diseases experience more symptoms of depression than those who do not[8,25]. Results showed that more than half of hospitalized patients had at least one chronic disease (58%), which explained the high prevalence of depression.

Our results showed that hospitalized patients who were at risk for depression paid more attention to a non-repetitive menu and good smell and taste for food service satisfaction than those who were not. Research also shows that patients' satisfaction with hospital meals is strongly influenced by food variety, taste, and presentation[31-33]. However, depression affects patients' decision-making processes and changes their choice-induced preferences[34]. Depression is associated with reduced olfactory sensitivity and identification capacity[35,36]. The olfactory impairment may lead patients who are at risk for depression to pay more attention to the smell of meals.

Our results showed that hospitalized patients who were informed of their illnesses by dietitians experienced higher levels of anxiety than those who were not. Research shows that calorie-restricted diets served by hospitals are associated with a high prevalence of anxiety[37].

Depression leads to a loss of appetite[27]. Research shows that patients who are at risk for anxiety and depression have fewer meals than those who are not[11,28,29]. However, German et al. (2008) report no relationship between depression and food intake[27]. While our results showed a direct association between anxiety/depression and less meal intake, the path analysis did not point to this relationship, which has also been reported by Sieske et al. (2019)[30]. Age, hospitalization, and gender may cause conflicting results because those researchers who reported lower food intake among patients at risk for depression were conducted on older adults[11,29].

Results did not point to a significant difference in BMI levels between patients who were at risk for anxiety/depression and those who were not. While Balcı (2021)[38] and Kaner et al (2015)[39] state that depression is associated with high BMI, other researchers[40] report that it is related to low BMI among hospitalized patients. However, Doğan, Yabancı Ayhan, and Varlı did not find an association between depression and BMI among Turkish geriatric patients[41]. Conflicting results may be due to different sample characteristics, such as age and disease type.

Our results showed that patients who were at risk for depression were significantly less satisfied with hospital food services than those who were not. Moreover, patients who were at risk for anxiety had significantly lower "food quality," "hunger and quantity," and "physical environment" subscale scores than those who were not. Our results are

consistent with those reported by Paquet et al. (2003)[42]. Research shows that anxiety and depression significantly affect overall life satisfaction[43,44]. Moreover, many researchers state anxiety and depression are negatively associated with adults' satisfaction with food-related life[45-49]. Satisfaction with food-related life includes being pleased with food, belief in having ideal food, and being satisfied by food in daily life[50]. Considering the common points in satisfaction with food-related life and food service satisfaction, we think that our results are not surprising.

Results showed that depression and anxiety were associated with daily energy and nutrient intake among hospitalized patients. We hypothesized that patients who were at risk for anxiety and depression had significantly less energy and nutrient intake than those who were not. The results showed that depression was negatively associated with food service satisfaction, which was related to low energy and nutrient intake. Path analysis showed that depression had a negative impact on all food service satisfaction dimensions but meal service quality. However, food service satisfaction sub-dimensions were not associated with daily energy intake, suggesting that depression has no direct or indirect relationship with daily energy intake, except for the small mediator contribution of meal service quality. This result was consistent with our earlier findings on the relationship between depression and meal consumption and BMI. Some researchers[39,41] report that patients diagnosed with depression have as much daily energy intake as healthy individuals. However, our results conflict with many other studies[14,15,17,51-53], Those studies that report a positive relationship between food service satisfaction and energy intake used a few or only one question to determine satisfaction. On the other hand, we employed a comprehensive question to determine the relationship between food service satisfaction and energy intake. Having administered the same scale, Collins et al. (2017)[54] argue that an increase in energy intake is not associated with food service satisfaction among hospitalized patients.

This is one of the first studies to focus on hospitalized adults to determine the association between the risk for anxiety/depression and food service satisfaction. However, this study has three limitations. First, we recruited patients from only one public hospital. However, it is a large hospital that admits many patients from nearby cities. Second, we used a 24-hour food recall to identify daily food groups and energy and nutrient intakes, which may not sufficiently represent the daily dietary intake. The Food Frequency Questionnaire could have reflected daily dietary intake better. Third, our participants stayed in the hospital for a short period. We can argue that longer hospital stays affect patients' food service satisfaction and risk for depression. Therefore, researchers should recruit more patients who stay in hospitals for a longer period of time. Moreover, they should monitor dietary recording periods for longer (e.g., three-day food record) and employ the Food Frequency Questionnaire.

Conclusion

Food service satisfaction is highly affected by anxiety and depression. Considering that patient satisfaction plays a central role in the evaluation of food service quality, our findings are surprising and worrying. While hospitalized patients who were at risk for anxiety/depression were less satisfied with hospital food services than those who were

not, their daily dietary intakes were similar. We can conclude that hospitalized patients who are at risk for anxiety/depression are more dissatisfied with hospital food services, but this dissatisfaction is not reflected in their actual dietary intake. Therefore, healthcare professionals should take hospitalized patients' psychological status to evaluate their satisfaction with hospital food services.

Acknowledgments

Declaration of Interest Statement

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A Look into High-Intensity Interval Training for Breast Cancer

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Abstract

Breast cancer is a common cancer worldwide. Although breast cancer affects both sexes, the prevalence is higher in women. In Türkiye, breast cancer affects about one in four women. Survival rates from breast cancer treatment are improving every day, and people need help with complications from treatment. Exercise is an effective and safe treatment for people with breast cancer. In recent years, the results on the use of high-intensity interval training (HIIT) in the treatment of breast cancer are remarkable. The purpose of this review was to determine the effect of HIIT in the treatment of breast cancer. The studies included in the review were those conducted between 2014 and 2024. PubMed, Scholar Google and Scopus databases were searched using the search terms "breast cancer and high intensity interval training". According to the results of the studies included in this review, it was concluded that HIIT is an effective form of training on several health parameters in groups at risk of developing breast cancer, those undergoing breast cancer treatment, and breast cancer survivors. Further studies are needed to contribute to the clinical relevance of HIIT in individuals with breast cancer.

Keywords: Exercise, breast cancer, high intensity interval training.

Meme Kanserinde Yüksek Yoğunluklu Aralıklı Antrenmana Bakış

Öz

Meme kanseri dünyada yaygın olarak görülen bir kanser türüdür. Her iki cinsiyette de görülmesine rağmen prevelans kadınlarda daha yüksektir. Türkiye'de meme kanseri yaklaşık her dört kadından birini etkilemektedir. Meme kanseri tedavisinde sağkalım oranları her geçen gün artmaktadır ve tedavinin ortaya çıkardığı komplikasyonlardan dolayı kişiler yardıma ihtiyaç duymaktadır. Meme kanseri olan bireylerde egzersiz etkili ve güvenilir bir yöntemdir. Son yıllarda meme kanseri tedavisinde yüksek şiddetli aralıklı antrenman (HIIT) kullanımına dair sonuçlar dikkat çekicidir. Bu derlemenin amacı meme kanseri tedavisinde HIIT'in etkisini ortaya koymaktır. Derlemeye dahil edilen çalışmalar 2014-2024 yılları arasında yapılan çalışmalardır. Pubmed, Scholar Google ve Scopus veri tabanlarında "meme kanseri ve yüksek şiddetli aralıklı antrenman" arama terimleri kullanılarak literatür taranmıştır. Bu derlemede yer alan çalışmalardan elde edilen bulgulara göre HIIT'in meme kanserine yakalanma açısından riskli gruplarda, meme kanseri tedavisi görenlerde ve meme kanserinden kurtulanlarda çeşitli sağlık parametreleri üzerinde etkisi olan bir antrenman biçimi olduğu sonucuna ulaşılmıştır. HIIT' in meme kanseri olan bireylerdeki klinik önemine katkı sağlamak adına daha geniş çaplı çalışmalara ihtiyaç vardır.

Anahtar Sözcükler: Egzersiz, meme kanseri, yüksek yoğunluklu aralıklı antrenman.

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Introduction

Breast cancer is one of the most common cancers in the world. This type of cancer, which is the most common in the female gender, accounts for approximately 25% of all cancers. It is also one of the leading causes of cancer-related deaths in women[1].

According to the Global Cancer Statistics 2022 report, the incidence of breast cancer in Turkey is 10.5% for both sexes. This rate ranks first in women with 23.5%. In other words, about ¼ of women in Türkiye have breast cancer. In addition, the mortality rate from breast cancer ranks second at 5.7%[2]. In this context, the follow-up of women of reproductive age is important. The risk of breast cancer is increasing in this population. The awareness of individuals in this age group about breast cancer should be increased[3].

Even when individuals with breast cancer recover, treatment-related complications may occur[4]. Therefore, it is important to address post-treatment rehabilitation approaches to manage breast cancer and alleviate treatment-related impairments. These individuals face a wide range of medical and psychosocial challenges that need to be managed appropriately[5]. Breast cancer survival rates are improving every day. However, individuals still need help due to complications caused by treatment. Especially cardiovascular diseases that occur due to treatment are rehabilitated with appropriate exercise programs[6].

Breast Cancer Risk Factors

Gender, inactive lifestyle, family history, smoking habit, height/weight ratio, number of births, menopausal status, number of pregnancies, socioeconomic status, education level, occupation are among the risk factors for breast cancer[7]. In addition, breast cancer can be hereditary. From this point of view, risk factors can be classified into genetic and non-genetic factors[8].

Types of Breast Cancer

There are 5 basic molecular subtypes of breast cancer: Luminal A, Luminal B, HER2 overexpressed, Basal-like, and Claudin low[9].

It is important to correctly classify the Luminal A and Luminal B subtypes of breast cancer. Luminal A type is the most common type of breast cancer. Making this molecular type classification will be beneficial in patient management[10].

Breast Cancer Stages

Staging classifications were developed to better understand the clinical behavior of specific malignancies, determine prognosis, and allow physicians and their patients to compare outcomes of similar patient groups[11]. The staging system is also important for individuals with cancer. According to the staging, the roadmap to be followed throughout the disease is outlined. Staging is done by physical examination and imaging. Then surgery is decided[12].

The American Joint Committee on Cancer (AJCC) staging system is most commonly used in breast cancer staging, and the latest 8th edition of the AJCC was updated in 2017[13].

According to the Turkish Society of Medical Oncology, stages 0, I, II, III and IV are used in cancer staging. Their characteristics are shown in Table 1[14].

Table 1. Cancer Staging[14]

Stage 0:	The cancer has not spread to surrounding tissue.
	It accounts for 15-20% of diagnosed cancers.
	This type of cancer can occur in the milk glands or milk ducts..
Stage I:	Tumor diameter is <2 cm.
	There is no spread to lymph nodes.
Stage IIA:	The tumor is <2 cm in diameter and has spread to the lymph nodes.
	Or the tumor is 2-5 cm in diameter but has not spread to the lymph nodes.
Stage IIB:	The tumor is 2-5 cm in diameter and has spread to the lymph nodes.
	Or the tumor is >5 cm in diameter but has not spread to the lymph nodes.
Stage IIIA:	The tumor is <5 cm in diameter but has spread to the lymph nodes.
	Or the tumor is >5 cm in diameter and has spread to the lymph nodes.
Stage IIIB:	The tumor, regardless of size, has spread 1-9 units to the chest wall and/or skin and lymph nodes.
Stage IIIC:	The tumor, regardless of size, has spread to the chest wall and/or skin and lymph nodes more than 10 units.
Stage IV:	The cancer has spread beyond the breast to other parts of the body (such as the bones, lungs, liver, or brain).

Breast cancer is a systemic disease. Metastases (the spread of cancer to other parts of the body) are usually detected when the tumor is larger than 1 cm in diameter and has spread to the axillary lymph nodes. Early diagnosis is very important because patients who are diagnosed and treated at an early stage can live longer and have a better quality of life. This has a positive effect on the patient's outlook on life and her enjoyment of life. Thanks to today's technology and medical approaches, breast cancer can be detected in a size of 1 cm or less[15]. According to a clinical study, mammography screening provides early detection of breast cancer and reduces mortality by 25% to 30%[16].

Breast Cancer Diagnosis Methods

In the diagnosis of breast disease, a specialist uses history, physical examination, imaging, and biopsy. While history, physical examination, and imaging are usually sufficient to diagnose benign diseases, biopsy is used in addition to these diagnostic methods to diagnose malignant diseases[17].

Breast Cancer Screening Methods

The most effective and appropriate screening methods for early detection of breast cancer include mammography (MG), breast examination (BE) by a physician or qualified

health professional, and breast self-examination (BSE). These strategies are recognized as the most important methods for early detection[18].

Radiologic screening methods are not limited to MG. Ultrasonography (USG), magnetic resonance imaging (MRI), and positron emission tomography (PET) are among the screening methods. USG is not included among the screening methods in Türkiye but is used as an adjunctive imaging method[19].

The "National Standards for Breast Cancer Screening Program" implemented by the Ministry of Health in Türkiye are Breast Self-Examination (BSE) once a month and Clinical Breast Examination (CBE) every 2 years for the age group 20-40, and BSE once a month, CBE once a year and MG screening every 2 years for the age group 40-69[20].

In 1993, the American Society of Radiology developed the Breast Imaging Reporting and Data System (BIRADS) to define lesions in clinical terms and to ensure consistency of terminology (20th Anniversary of the American Society of Radiology). The BIRADS classification is scored from zero to six. While BIRADS 0 requires additional examination for a decision, BIRADS indicates a known malignancy[21,22].

Treatment of Breast Cancer

Breast cancer treatment is divided into local treatment and systemic treatment. Local treatment aims to destroy the tumor with surgical methods or radiation therapy. Systemic treatment aims to destroy metastasized tumor cells with chemotherapy, hormone therapy, or immunotherapy[23].

Surgical treatment is a method used mainly in early-stage cancers. There are different surgical methods, including mastectomy, in which the entire breast tissue is removed, and breast-conserving surgery, in which only the tumor and its surroundings are removed[24]. Radiation therapy is based on destroying cancer cells in the breast tissue using high-energy radiation. It has been reported that some women undergoing breast cancer treatment need radiotherapy as an additional treatment[25].

Chemotherapy, which is included in systemic treatment, is defined as the use of treatment to stop or destroy the growth of malignant cells. These drugs can be given intravenously or orally and can travel through the bloodstream to cancer cells in different parts of the body. In addition to all these situations, sometimes chemotherapy drugs can also be administered directly into the spinal fluid surrounding the brain and spinal cord[25].

Immunotherapy is a type of treatment that uses cells from a person's immune system to fight diseases such as cancer. The main goal of immunotherapy for cancer is to reactivate the immune system, which has been suppressed by cancer cells, and enable it to recognize cancer cells. In this way, cells of the immune system target cancer cells and try to destroy them[26]. In short, it is a method of boosting the immune system against tumor cells.

Finally, some types of breast cancer are hormone-sensitive tumors characterized by the expression of estrogen and progesterone receptors. These cancer cells have receptors that help them grow by binding to estrogen and progesterone. In the treatment of breast cancer, there are several hormonal therapies that prevent estrogen from binding to the

receptors. Most of these treatments work by lowering estrogen levels or blocking the effect of estrogen on breast cancer cells. Hormone therapy is recommended for breast cancer patients who are hormone receptor positive[25].

Breast Cancer Rehabilitation

In patients with breast cancer, physical complications may develop after surgery and adjuvant treatments, and exercise is a safe and effective method in eliminating these complications and improving quality of life[27,28]. Various types of exercises, such as resistance, aerobic, calisthenics, progressive relaxation are used in patients undergoing breast cancer treatment[27-30]. Lymphedema is a common condition in women following breast cancer treatment[31]. Lymphedema physiotherapy includes manual lymph drainage, remedial exercises, aerobic exercises, normal joint movement exercises, stretching, and strengthening exercises[32,33]. A review of the current literature also includes studies on the use of high-intensity interval training (HIIT), which has become popular in recent years for breast cancer.

High Intensity Interval Training (HIIT)

High-intensity interval training (HIIT) is a time-efficient method that improves both aerobic and anaerobic strength and capacity[34]. Athletes typically perform HIIT training consisting of classic exercise methods such as running, cycling, and rowing to improve endurance and sport-specific performance[34,35]. In the HIIT method, there are exercise and rest periods; the exercise intensity is high and the exercise duration is low and the rest interval is short[36]. The HIIT method is traditionally a workout in which the VO2Max remains above 90% for 2-4 min of high intensity runs or 30 s of 30 s of rest[37]. The HIIT method typically consists of 6 to 11 repetitions of workout/rest intervals[38]. HIIT benefits both healthy people and those with chronic diseases in several health markers[36].

Material and Methods

This review examined studies on the use of HIIT for breast cancer. The scope of the review was limited to studies conducted between 2014 and 2024. The literature was searched in PubMed, Scholar Google, and Scopus databases using the search terms "breast cancer and high intensity interval training". The flowchart of the literature samples accessible within the scope of the topic is shown in Figure 1.

Figure 1. Literature Review Flowchart
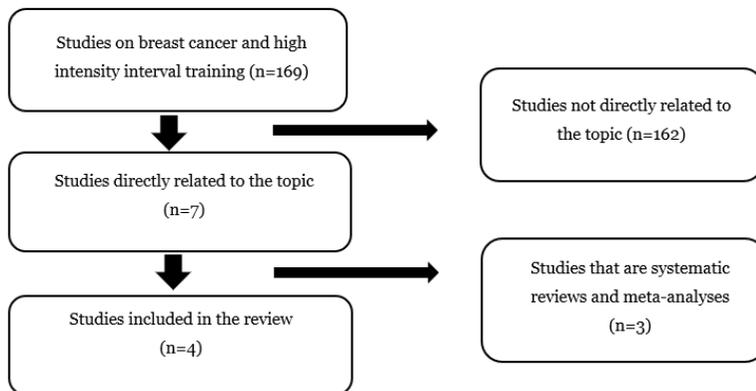
Table 2. Summary of studies reviewed in the review on breast cancer and HIIT

Authors,year	Research Group	Method	Conclusion
Coletta AM, et al. (2019)[39]	44 obese women at risk for postmenopausal breast disease with a mean age of 63.9±8.8 years.	The 44 women in the study were randomized to high intensity interval training (HIIT), moderate intensity continuous training (MICT), and usual care (UC) groups for 12 weeks/3 times per week.	The results of the study in obese postmenopausal women at risk for breast cancer showed that there was no significant difference between the groups in terms of body weight and body mass index, but HIIT was associated with more improvement in terms of cardiorespiratory fitness.
Mijwel S, et al. (2018)[40]	240 women aged 18-79 years receiving chemotherapy	The effects of concurrent resistance and high-intensity interval training (RT-HIIT) or concurrent moderate-intensity aerobic and high-intensity interval training (AT-HIIT) on usual care (UC) were evaluated. 240 women were randomized to 16 weeks of RT-HIIT, AT-HIIT, or UC treatment.	The study results concluded that a 16-week supervised RT-HIIT intervention significantly increased muscle strength and prevented hyperalgesia in breast cancer patients receiving chemotherapy. It was also concluded that RT-HIIT was as effective as AT-HIIT in improving cardiorespiratory fitness.
Wilson R, et al. (2023)[41]	A total of 50 women diagnosed with breast cancer	50 breast cancer patients undergoing chemotherapy were randomized to HIIT or an attention control group. The HIIT group performed a 16-week intervention three times a week. The attention control group was given a stretching program with no exercise component and asked to maintain their exercise level for 16 weeks.	The study results add to the existing evidence on the role of HIIT in managing cognitive function and various patient-reported outcomes in breast cancer patients undergoing chemotherapy.
Ochi E, et al. (2022)[42]	50 women aged 20-59 with stage I-IIa breast cancer	Fifty women who had completed initial treatment other than hormone therapy were randomized to HIIT or control. HIIT was performed at home for 12 weeks with smartphone support.	We conclude that a home-based HIIT intervention can lead to improved cardiorespiratory fitness and muscle strength in early-stage breast cancer survivors.
Bettariga F, et al.(2024) [43]	28 breast cancer survivors (Stage I-III) (Age: 55.5±8.8 years, BMI: 27.9±5 kg/m²)	Participants were randomly assigned to 12 weeks of supervised resistance training (n=14) or HIIT (n=14), three times per week. Body composition, muscle strength (1RM), cardiovascular fitness (CRF), Ekblom Bak Cycle Test, and quality of life (QoL) (EORTC QLQ-C30 and EORTC QLQ-BR45) were assessed at baseline and after 12 weeks.	Both exercise groups improved body composition, physical fitness, and QoL. Resistance training led to greater increases in lean mass and muscle strength, while HIIT resulted in greater fat mass reduction and CRF improvement.
Klavina A, et al. (2024) [44]	Fifty-six patients (48.56±7.84 years) with newly diagnosed locally advanced (stage II-III) breast cancer requiring neoadjuvant chemotherapy (NACT)	6 months, randomized to HIIT group (2-3 weekly HIIT sessions at 85-95% peak HR) and control group following oncologist's standard care	HIIT was effective in reducing breast cancer symptoms, systemic treatment side effects, and cancer-related symptoms, improving quality of life in breast cancer patients during NAC.

Conclusion and Suggestions

There are studies in the literature on the role of HIIT in breast cancer[39-44]. HIIT has become an important component of exercise prescription in breast cancer treatment. HIIT is a form of exercise that has beneficial effects on various health parameters in breast cancer risk groups, breast cancer survivors and breast cancer patients.

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Methodological studies including and comparing larger populations, different age groups and breast cancer survivors at different stages are needed to increase the clinical importance of HIIT in breast cancer patients.

We believe that this review will make an important contribution to the literature by addressing the role of HIIT in breast cancer treatment and provide an overview of the topic. Our study highlights the effects and potential benefits of HIIT on breast cancer patients. In this context, we believe that our study aims to provide valuable information for clinical applications by addressing the effects of HIIT in breast cancer treatment from a broader perspective.

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What Should be the Ideal Carbohydrate Intake in Type 1 Diabetes?: A Literature Review

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Abstract

The purpose of this literature review is to assess the impact of carbohydrate intake through diet on postprandial glycemia for individuals with type 1 diabetes and to provide insight into the recommended carbohydrate intake outlined in national and international guidelines by determining ideal intake quantities. A literature search and standard data extraction were conducted using Google Scholar, PubMed, and Web of Science Databases. The literature review spanned from January to June 2023. Given the limited number of studies involving individuals with type 1 diabetes, a total of 7 research articles were thoroughly examined. While both long-term and short-term studies have investigated high- and low-carbohydrate diets in type 1 diabetes, only one study design was found that explored the effects of closely related ratios (comparing 45% to 50%) on postprandial glycemia. Although many studies have primarily concentrated on low-carb diets, there exists a gap in the scientific literature despite some evidence indicating potential glycemic improvements in individuals with type 1 diabetes on such diets. It's noted that adopting such a diet might elevate the risk of cardiovascular diseases in the long run and potentially hinder growth, particularly in children. This literature review has identified various interventions with positive impacts on glycemic control for different levels of carbohydrate intake. General recommendations from guidelines developed for individuals with type 1 diabetes suggest that 50% of total energy intake should come from carbohydrates, with a preference for complex carbohydrate sources.

Keywords: Type 1 diabetes, carbohydrate intake, postprandial glycemia.

Tip 1 Diyabette İdeal Karbonhidrat Alımı Ne Olmalıdır?: Literatür Taraması

Öz

Bu literatür taramasının amacı, tip 1 diyabetli bireylerde diyette karbonhidrat alımının postprandiyal glisemi üzerindeki etkisini değerlendirmek ve ideal alım miktarlarını belirleyerek ulusal ve uluslararası kılavuzlarda belirtilen önerilen karbonhidrat alımına ilişkin fikir sağlamaktır. Google Akademik, PubMed ve Web of Science veritabanları kullanılarak literatür taraması yapılmıştır. Literatür taraması Ocak-Haziran 2023 dönemini kapsamaktaydı. Tip 1 diyabetli bireyleri kapsayan sınırlı sayıdaki çalışma göz önüne alındığında, toplam 7 araştırma makalesi kapsamlı bir şekilde incelenmiştir. Hem uzun süreli hem de kısa süreli çalışmalar tip 1 diyabette yüksek ve düşük karbonhidratlı diyetleri araştırırken, yakın oranların (%45 ila %50'yi karşılaştıran) postprandiyal glisemi üzerindeki etkilerini araştıran yalnızca bir çalışma tasarımı bulunmuştur. Pek çok çalışma öncelikle düşük karbonhidratlı diyetler üzerine yoğunlaşmış olsa da, bu tür diyetler uygulayan tip 1 diyabetli bireylerde potansiyel glisemik iyileşmeler olduğunu gösteren bazı kanıtlara rağmen bilimsel literatürde bir boşluk bulunmaktadır. Bu diyetlerin benimsenmesinin uzun vadede kardiyovasküler hastalık riskini artırabileceği ve özellikle çocuklarda büyümeyi engelleyebileceği belirtilmektedir. Bu literatür incelemesi, farklı karbonhidrat alımı seviyeleri için glisemik kontrol üzerinde olumlu etkileri olan çeşitli müdahaleleri tanımlamıştır. Tip 1 diyabetli bireyler için geliştirilen kılavuzlardaki genel öneriler, toplam enerji alımının %50'sinin karbonhidratlardan gelmesi gerektiğini ve kompleks karbonhidrat kaynaklarının tercih edilmesini önermektedir.

Anahtar Sözcükler: Tip 1 diyabet, karbonhidratlı alımı, postprandial glisemi.

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Introduction

Type 1 diabetes (T1D) is a group of metabolic diseases characterized by insulin deficiency resulting from autoimmune destruction of β-cells and the consequent development of hyperglycemia. Although T1D is classified as having a young onset, the disease can manifest at any age, and up to 50% of cases emerge during adulthood[1]. According to the International Diabetes Federation (IDF) 2021 report, it is projected that approximately 537 million individuals worldwide have diabetes, and if the current trend continues, it is estimated that by the year 2045, there will be 784 million individuals aged 20-79 with diabetes[2].

In individuals with T1D carbohydrates are the primary determinant of postprandial glycemic response[3]. For individuals with diabetes, achieving and maintaining health and optimal glycemic control require balanced nutrient intake, managing carbohydrate load, reducing glycemic index, and establishing a healthy eating pattern[4]. Providing 45-50% of daily energy from carbohydrates demonstrates the ability to achieve optimal postprandial glycemic control[5]. Carbohydrate intake should include high-fiber and minimally processed, quality carbohydrate sources. Meal plans should consist of non-starchy vegetables, minimal added sugar, fruits, and whole grain products[6].

Material and Methods

For this literature review, a search of the relevant literature was conducted in the Google Scholar and PubMed, Web of Science Databases. A literature review was conducted between January and June 2023 for the study. The descriptors used for the search were as follows, in accordance with the MeSH index: "type 1 diabetes mellitus", "dietary carbohydrates intake" and "carbohydrates rate". The study included literature review, case reports and clinical studies. Studies between the years 2011-2023 are included.Studies were filtered for relevance. Studies were excluded if the results were not relevant to the subject of the review or were clearly of low quality. The final review includes seven articles and twenty-five referenced articles. Important conclusions or conclusions were drawn from each of these articles.

Strengths of Review

Low-carbohydrate diets have been investigated in the treatment of T1D up to this day. The main strength of the current review lies in the inclusion of studies comparing the effects of diets such as 50% carbohydrate intake or the Mediterranean diet to low-carbohydrate diets on postprandial glycemia. This approach will be beneficial in evaluating the optimal carbohydrate intake, considering national dietary guidelines in our study.

Recommended Carbohydrate Ratios in Guidelines

Recommendations regarding carbohydrate intake have significantly varied over the years, ranging from 40% (Joslin Diabetes Center) to 60% (Diabetes and Nutrition Study Group of EASD and Diabetes Association in the UK). Since 2008, ADA guidelines have not specified a particular percentage range for carbohydrate and other macro-nutrient intake. It wasn't until 2014 that ADA's consensus statement proposed that there isn't an

ideal macro-nutrient composition for diets targeting diabetic patients and that there is no optimal carbohydrate amount in a diabetes diet plan[7].

Table 1. Recommended carbohydrate ratios in guidelines for type 1 diabetes [5,6,8-10]

ISPAD,2018	ADA,2021	DDTR, 2021	TUBER, 2022	Diabetes Canada, 2022
50-55% carbohydrates (average intake of 150 g/day for children aged 1.5-3 years; 200 g/day for children aged 4-10 years)	The ratio is not specified. High fiber and unprocessed carbohydrate intake are recommended (Level B evidence).	45-65 % (least 130 g)	45-60 %	≥ 45 %

ISPAD: International Society for Pediatric and Adolescent Diabetes, ADA: American Diabetes Association, DDTR: Diabetes Diagnosis and Treatment Recommendations, TUBER: Turkey Nutrition Guidelines

When examining guidelines aimed at children, the National Institute for Health and Care Excellence recommends that energy intake should be derived from approximately 50-55% carbohydrates, less than 35% fats, and 15-20% proteins[11]. National guidelines of Australia and Canada for individuals with diabetes recommend that at least 45% of daily energy intake should come from carbohydrates in the diet[10,12]. The carbohydrate intake recommended by the Nutrition Associations of Germany, Austria, and Switzerland ranges from 56% to 90%. However, studies on dietary intake of individuals with diabetes indicate a discrepancy between recommended and reported intakes, with this gap increasing significantly with age. It is noted that particularly adolescent individuals with diabetes have carbohydrate intakes below the recommended levels[13,14]. Similarly, the evidence-based practice guidelines of the Japan Diabetes Society recommend that 50-60% of energy should come from carbohydrates and highlight that carbohydrate intake levels for individuals with diabetes range from 40% to 60%[15].

Discussion

In recent years, diets with different carbohydrate ratios and contents are being clinically tested for their impact on postprandial glycemia. In this review, it has been determined that a low-carbohydrate diet leads to clinically more significant reductions in blood glucose levels compared to high and 50% carbohydrate intake. However, it has also been observed that ketone bodies could lead to increases in blood lipid levels (Table 2). In a study conducted in Japan with individuals with T1D, it was determined that patients who consumed less than 50% of their total energy from carbohydrates spent less time in postprandial hyperglycemia and more time in hyperglycemia[16]. Low-carbohydrate diets are often tested (Table 2). The most controversial aspect of low-carbohydrate diets is their potential to increase the risk of cardiovascular disease due to higher total and saturated fat intakes[17]. In adults following very low-carbohydrate diets, it has been found that there are higher saturated fat intakes (daily fat intake of 39% ± 11%)[18]. Furthermore, among the risks associated with low-carbohydrate diets are ketoacidosis, hypoglycemic unawareness due to ketosis, impaired adrenal response after hypoglycemia, growth retardation, and long-term cardiometabolic risks. However, there are studies indicating that short stature is highly correlated with HbA1c levels and that HbA1c serves as one of

the strongest determinants of cardiovascular diseases[19]. Low-carbohydrate, high-fat diets can result in lower energy intake than recommended. Due to restrictions in food groups, deficiencies in fiber, thiamine, vitamin B6, and iodine are possible[20]. Very low-carbohydrate diets are also believed to cause ketoacidosis, encourage urinary calcium loss, and lead to low bone mineral density, increasing the risk of osteoporosis[17]. While there are few studies on this topic, an animal study demonstrated that low-carbohydrate diets induced low bone mineral density in rats[20].

Table 2. Diets with different carbohydrate contents and clinical outcomes

Study details	Population	Intervention	Results
Levran et al., Israel, prospective intervention clinical trial (2023)[21]	T1D, 20 adolescents	LCD; 50-80 g/day, 12 weeks	HbA1c level decreased from 8.1% (7.5; 9.4) to 7.7% (6.9; 8.2) ($p = 0.021$). Adolescents showed reductions in BMI z-score ($p = 0.019$) and waist circumference ($p = 0.007$)
Issaksson et al., Sweden, Randomized-cross-over (2023)[22]	T1D and inadequate glycemic control (HbA1c>= 7.5%), 54 adults	Moderate carbohydrate diet (30% total energy from carbohydrates) Traditional diabetes diet (50% total energy from carbohydrates), 4 weeks	Design of a randomized cross-over study
Dimosthenopoulos ve ark., Athens, Randomized- clinical trial (2021)[7]	T1D, 15 individuals	**Three different/isocaloric diet** High-protein/low carbohydrate (20%) Mediterranean/low glycaemic index (40%) carbohydrates, 50% carbohydrates, 4 weeks	Euglycaemic range was not statistically different between HPD, MED and REF ($p = 0.105$). During the HPD period, 11 out of 15 participants spent more time within euglycameic compared with either the REF or MED.
Ranjan et al., Denmark, randomized controlled (2017)[23]	T1D, 10 individuals	LCD; ≤50 g/day HCD; ≥250 g/day, 1 weeks	Compared to HCD on LCD, the ratio of the duration with blood sugar concentration between 3.9-10.0 mmol/L is higher (83% ± 9% ve72%±11%; $p = 0,02$). In LCD, ketone bodies and free fatty acid levels
Schmidt et al., Denmark, randomized controlled (2019)[24]	T1D,14 individuals	LCD; ≤100 g/day, HCD; ≥250 g/day, 12 weeks	The duration spent in the range of 3.9-10.0 mmol/L did not differ significantly between the groups (LCD 68.6 ± 8.9% and HCD 65.3 ± 6.5%, $p = 0.316$). In the LCD diet, the time spent <3.9 mmol/L was lower (1.9% vs. 3.6%, $p <0.001$), and glycemic variability was lower (32.7% vs. 37.5%, $p = 0.013$). Severe hypoglycemia was not reported in either of the diets.
Krebs et al., New Zeland, randomized controlled (2016)[25]	T1D,10 individuals	The standard diet Low carbohydrates (50-75 g), 12 weeks	In the LCD group, there were significant reductions in HbA1c (from 63 to 55 mmol/mol or 8.9% to 8.2%,

			p<0.05) and daily insulin usage (from 64.4 to 44.2 units/day, *p*<0.05).
			No changes have been observed in the blood lipid profile.
Leow et al., Australia, randomized controlled trial (2018)[18]	T1D 11 individuals	<55 g/day of carbohydrates, 1.5 years	Participants spent 74±20% of their time in the glycemic range (4-8 mmol/l) and 3±8% in the hyperglycemic (>10 mmol/l) range. Among the participants, total cholesterol, LDL cholesterol, total cholesterol/HDL cholesterol ratio, and triglycerides were within the recommended range in 82%, 82%, 64%, and 27% respectively.

* LCD: Low Carbohydrate Diet HCD: High Carbohydrate Diet VLCD: Very Low Carbohydrate Diet HDL: High-Density Lipoprotein LDL: Low-Density Lipoprotein HPD: High-Protein/Low-Carbohydrate Diet MED: Mediterranean Diet REF: Reference Diet

Conclusion

While there have been long-term and short-term studies examining high and low carbohydrate diets in T1D, only one study investigating the effects of close ratios (comparing 45% to 50%) on postprandial glycemia has been identified. Despite some evidence suggesting that a low-carbohydrate diet could improve glycemia in diabetic individuals, there is a scientific literature gap. It's noted that in the long term, such a diet could increase cardiovascular disease risk and particularly lead to growth retardation in children.

As a general conclusion drawn from guidelines and clinical studies, the recommended ratio for individuals with T1D is for 50% of total energy intake to come from carbohydrates.

Author's Contributions

BB: Conceptualization, Research, Data curation, Project administration, Writing – review and editing. **VO:** Research, Data Curation, Project administration, Writing – review and editing.

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Eating Disorder in Individuals with Type 1 Diabetes Mellitus: Diabulimia

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Abstract

Diabulimia is an eating disorder seen in patients with T1DM, has drawn the media's attention by the troubles it causes. T1DM, which is mostly seen in adolescents and children, requires individuals to follow a medical nutrition plan. This situation can challenge patients psycologically resulting in some eating disorder behaviors like binge eating, skipping meals and skipping insulin shots. It is critical to detect eating disorder behaviors early in order to prevent undesirable clinical features such as weight loss, poor glycemic control, diabetes complications, etc. Likewise, it is very important that the patient is treated and monitored by a multidisciplinary team. A better understanding and treatment of diabulimia will significantly improve the quality of life of individuals desired by this condition.

Keywords: Diabulimia, glycemic control, type 1 diabetes mellitus, eating disorder.

Tip 1 Diyabet Mellituslu Bireylerde Yeme Bozukluğu: Diabulimia

Öz

Diabulimia, T1DM hastalarında görülen bir yeme bozukluğudur ve neden olduğu sıkıntılarla medyanın dikkatini çekmiştir. Çoğunlukla ergenlerde ve çocuklarda görülen T1DM, bireylerin tıbbi bir beslenme planını takip etmesini gerektirir. Bu durum, hastaları psikolojik olarak zorlayabilir ve aşırı yeme, öğün atlama ve insülin enjeksiyonlarını atlama gibi bazı yeme bozukluğu davranışlarına neden olabilir. Vücut ağırlığı kaybı, zayıf glisemik kontrol, diyabet komplikasyonları vb. gibi istenmeyen klinik özellikleri önlemek için yeme bozukluğu davranışlarını erken tespit etmek kritik öneme sahiptir. Aynı şekilde, hastanın multidisipliner bir ekip tarafından tedavi edilmesi ve izlenmesi çok önemlidir. Diabuliminin daha iyi anlaşılması ve tedavisi, bu durumun arzu ettiği bireylerin yaşam kalitesini önemli ölçüde iyileştirecektir.

Anahtar Sözcükler: Diabulimia, glisemik kontrol, tip 1 diyabet mellitus, yeme bozukluğu.

Introduction

Type 1 Diabetes Mellitus is a chronic autoimmune disease that is weakened by insulin deficiency and resulting hyperglycemia[1]. This type of diabetes statements for approximately 10% of all diabetes cases and is usually seen in children and young children[2]. Type 1 diabetes is believed to result from immune-mediated β-cell destruction leading to insulin deficiency, hyperglycemia. Classical hyperglycemia is rapid in onset, especially in young children, and symptoms of polyuria, polydipsia, body weight loss, abdominal muscles, headaches and ketoacidosis are observed locally[3]. T1DM is slightly more common in boys and adult men, while rates of autoimmune disorders are higher. Tip 1: Seasonal changes in the DM and changes depending on the month of birth are

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observed. Cases were detected in the autumn and winter months, and those born in the spring were collaborated with a higher risk of T1DM[4].

Subcutaneous exogenous insulin replacement therapy is the cornerstone of diabetes management in order to maintain near-normal glucose concentrations[5]. All patients with T1DM should receive nutritional counseling and personalized nutrition plans should be prepared according to cultural, regional, traditional and seasonal changes[6].

Prepared medical nutrition plans are of great importance for both the physical and mental health of the patient. Because lists and prohibited foods in personal nutrition plans can lead patients to anxiety and cause them to constantly think about food and body weight[7]. In this case, patients with T1DM may skip insulin administration, disrupt meal patterns, etc. to lose body weight. may cause behaviors to occur[8].

Diabulimia is defined as an eating disorder wised by individuals with T1DM and is characterized by intentional restriction of insulin resulting in body weight loss[9]. It is thought that the psychosocial stress brought about by the management of this chronic disease, called diabetes distress, may contribute to the development of diabulimia[10]. Diabulimia, which was awarded to researchers at Kings College London for 5 years of work in 2019 and was included in a section on diabetes for the first time in the NICE guidelines for the treatment of eating disorders, has been a popular research topic in recent years[11,12]. The term 'diabulimia' poses a unique problem as guidelines on how best to treat those with insulin restriction suggest that people with T1DM, eating disorders, particularly those with insulin deficiency, present a unique problem[13]. This review study was planned and carried out to examine diabulimia, an important eating disorder seen in T1DM patients, to draw attention to the issue and to raise awareness.

Eating Disorders and Type 1 DM

The term "Diabulimia" (Eating Disorder-Diabetes Mellitus Type 1-ED-DM1) is described as an eating behavior disorder that restricts insulin use as a purifying behavior in order to lose body weight, usually seen in adolescents or young adults, predominantly female patients. This behavior is also associated with binge eating and disordered eating behaviors[14]. Diabulimia is not currently assigned a specific diagnostic code in DSM-5, but is described in the literature[15]. Due to the severe consequences experienced by young people suffering from this condition, diabulimia has attracted the attention of the media and has even been pictured as "the world's most hazardous eating disorder"[16]. Eating disorders in diabetics, which were first seen in the 1970s, are more common in individuals with T1DM than in the general population[7]. Women with type 1 diabetes are twice as likely to develop an eating disorder as women without diabetes. In a study, eating disorder behaviors were observed in 20% of 33 male patients with Type 1 DM who participated in the study[17]. In another study conducted with adolescent and young adult individuals with T1DM, the incidence of eating disorders was found to be 21.2%[18].

Although eating disorders in T1DM have recently been heard under the term "Diabulimia", in fact, this term is not sufficient, does not cover the wide range of concurrent eating disorders and T1DM, and may potentially lead to individuals with T1DM not being recognized for diagnosis and falling within this category[19]. Individuals with diabetes may encounter many complex medical and psychosocial problems[20]. The

concept of "eating disorder" encompasses mild and extreme dieting behaviors, binge eating, and compensatory behaviors for body weight control. Compensatory behaviors for body weight control include self-induced vomiting. Individuals demonstrate non-draining behaviors such as starvation, abuse of diet pills, and excessive and strenuous exercise to control body weight[7]. Patients with bad eating habits stay away from sugar and fat, restrict the foods they eat, and skip meals to lose weight. On the other hand, they often eat large amounts of food, limit their insulin, or skip meals because they feel guilty. These patients appear to rapidly develop one of the most serious acute complications of diabetes. In this situation, individuals may experience increased blood sugar, insulin deficiency, and increased levels of hormones that inhibit the effect of insulin. It causes conditions to occur and the development of diabetic ketoacidosis[21]. In a study conducted with 143 adolescents with type 1 diabetes, it was found that 10.3% of girls skipped their insulin and 7.4% applied less insulin to control their body weight[22]. In another 4-year follow-up study, noncompliance with the diet was initially observed in 38%, binge eating in 45%, insulin neglect in 14%, self-induced vomiting in 8%[23]. In general, it is estimated that 30-40% of adolescents, young adults with diabetes skip insulin administration after meals to lose body weight[8].

Physiopathology

Individuals with type 1 DM discover the anabolic properties of insulin at a very early age. In addition, before the diagnosis of diabetes is made, body weight is lost as a result of insulin deficiency in the body, and with the start of insulin treatment, patients begin to regain body weight. Failure to comply with nutrition plans and dissatisfaction with body weight leads to limiting or skipping insulin use, and this exposes them to serious complications when they decide to gradually reduce their insulin dose[14]. Blood sugar levels increase with limiting or skipping insulin use, and glycosuria and energy loss occur rapidly[18]. The eating disorder may exist before diabetes, or diabetes may detent an eating disorder. At the first diagnosis of diabetes, body weight loss is usually papered by the individual and/or family members[24]. The individual may have received positive feedback from those around him regarding the body weight loss that occurred before the diagnosis of diabetes[14].

Diabulimia patients present disordered eating behaviors. And also they abstain sweets and fats, restrict the foods they eat and skip meals, losing body weight, and on the other hand, they often consume large amounts of food and feel guilty, then limit or skip insulin[18]. It is known that the fear of gaining body weight is a key component in the occurrence of insulin underdosing[9]. Individuals believe they have a "secret trick" for body weight loss and feel in control of their bodies. Individuals are often unaware of the long-term results of insulin neglect until they experience important complications. In this way, patients experience a feeling of extreme control over their own bodies and think that they have discovered how to control their weight without being detected by others[14]. Diabetes can be a fertile ground for the development of eating disorders due to the need to follow an incorrect eating plan with strict dietary restrictions that require limiting certain types of food and paying attention to limited daily food, energy and nutrient intake[14]. In a study conducted with 45 individuals with type 1 diabetes and a history of insulin misuse, when the patients were asked why they cut down on insulin, 35 said the main reason was body

weight loss, 8 said they hated diabetes and wanted to regain control. 2 of them stated that it was self-harming[9].

Risk Factors

Although the etiology of eating disorders is still not fully understood, it is known to involve a combination of genetic, biological, environmental and cultural factors[25,26]. Common denominators in the emergence of eating disorders in T1DM can be listed as gender, especially women, increased body weight, body dissatisfaction, nutrition and history of depression[26]. In a systematic review study, it was reported that depression and poor diabetes management are mutual causes of each other, and depression leads to worse management of diabetes and poor diabetes management leads to increased levels of depression[27]. Sociocultural causes for eating disorders The "Western" culture's ideal of female beauty, extreme thinness, and objectification of the female body are considered specific risk factors for the emergence of eating disorders[28]. For this reason, eating disorders can be seen more frequently in women and young girls[20]. Risk factors for diabulimia are presented in figure 1.

Figure 1. Risk factors for diabulimia
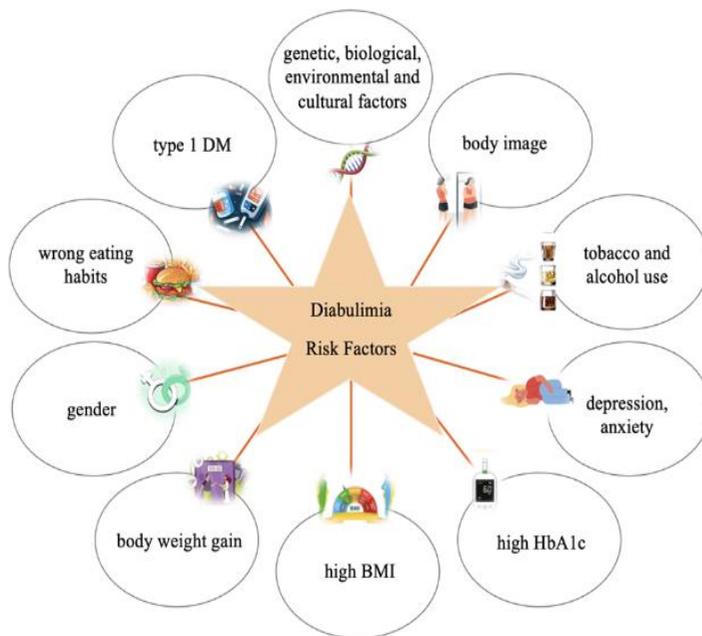
In a study conducted with young people aged 20 and under, eating disorder behaviors were observed in two-thirds of the girls, 71% of whom had T1DM[20]. In another study conducted with adolescents, it was found that 10.3% of girls skipped insulin administration and 7.4% took less insulin for body weight loss, while this situation was only 1.4% in boys[29]. Adolescence brings numerous cognitive and physical changes, as well as unsafe sexual behavior, tobacco and alcohol use and unhealthy eating habits, etc.[25]. In another study conducted with young people who were followed for 5 years during the transition from childhood to adolescence, body dissatisfaction was found to be a significant predictor in determining eating disorders[30]. In another study conducted on

adult individuals with T1DM, it was found that the HbA1c value and BMI were slightly higher in individuals with eating disorders[17].

In some studies, it was found that the HbA1c level of those at risk of diabulimia was significantly higher[31,32]. In a study conducted by Doyle et al. with individuals with diabetes, it was found that patients with high Diabetes Eating Problems Questionnaire-Revised (DEPS-R) score had significantly higher HbA1c levels than those with low scores[17]. In a study conducted with 100 adolescents with diabetes in India, the relationship between diabetes-specific impaired eating behavior and glycemic control was examined. According to the DEPS-R score, the average HbA1c level of diabetic individuals with impaired eating behavior was found to be significantly higher than those without risk of impaired eating behavior[33]. However, similar studies indicate that insulin omission in order to lose weight is observed more frequently in girls and the average DEPS-R score is higher[34,35]. It is thought that the risk of diabulimia is becoming increasingly common in men and is an important problem in both male and female genders[36].

In another study conducted with adolescent girls with Type 1 DM, eating disorder was associated with high BMI value[37]. Another factor may be the structure of the family meal and the habits of the family. It has been found that the likelihood of eating disordered behaviors is higher in adolescent girls with T1DM in families that rarely eat family meals, have lower household income, and whose parents are less educated[38]. In two studies conducted with young people with T1DM, eating disorders were associated with poor glycemic control of the participants[20,39]. In another study, youth at risk for eating disorders were 59.1% versus 31.8% more likely to be overweight/obese than those at low risk, and the at-risk group had lower diet quality and higher total fat and saturated fat intake than the low-risk group. It has been determined that they have[40].

Tablo 1. Diabulima risk factors identified in some studies on diabulimia and scales applied in these studies

Reference	Study design	Risk Factors	Diagnostic Scale
(41)	105 adolescents aged between 12-20	Female gender, concern about insulin, age, disease perception	The Child Eating Disorder Examination (ChEDE)
(42)	234 women aged between 24 and 72	Diabetes complications, diabetes stress, psychological problems in general, fear of hypoglycemia	64-item Eating Disorders Inventory, 36-item Bulimia Test-Revised
(43)	138 children aged 8-19	Female gender, age, BMI, duration of disease	CHEAT, EAT-26
(44)	52,215 patients aged between 8-30	Female gender, duration of disease, age, immigration status	DSM-IV criteria
(45)	178 adolescents aged between 13-17	Female gender, duration of disease, educational level of parents, BMI, poor glycemic control, depressive symptoms	DEPS-R

(46)	163 adolescents aged between 11-20	High BMI, low physical activity, low socioeconomic status, poor glycemic control	DEPS-R (Italian version)
(47)	183 adolescents between the ages of 13 and 18	Female gender, BMI, HbA1C (in women), body image issues, duration of disease (in men), media pressure (in women)	DEPS-R, EDI-3RF
(48)	770 children and adolescents aged 11-19	Female gender, age, high BMI, high HbA1C (poor metabolic control)	DEPS-R
(49)	300 adolescents and adults aged 16-28	Female gender, high BMI, high HbA1C	DEPS-R
(34)	477 adolescents aged between 13-19	Female gender, age (in women), high BMI, high HbA1C, body dissatisfaction	DEPS-R
(20)	2156 young people with an average age of 18	Female gender, high BMI, age, low income level, parents' education level, insulin sensitivity, high HbA1C (poor glycemic control), DKA, depressive symptoms, low quality of life	DEPS-R
(32)	192 children and adolescents aged 11-19	Age, disease duration, high BMI, high HbA1C, FBG, TG	DEPS-R
(50)	136 children and adolescents with an average age of 14	Poor glycemic control, poor diabetes management	DEPS-R
(51)	31556 people aged between 6 months and 23 years	Late pubertal age, not using a pump, no history of migration, high HbA1c, frequency of DKA and hypoglycemia	DSM-IV criteria
(52)	Children and adolescents between the ages of 10-15	Age, high HbA1C, high BMI	PEBEQ
(53)	151 young people aged between 13-18	Female gender, low priority on family meals, parental lack of a good model for healthy eating, more food restrictions at home, family conflict	DEPS-R
(54)	83 adults ages 18-68	Negative interaction before eating, not following the diet, feeling guilty about eating, feeling sorry for one's illness/trying not to think about one's illness	DEPS-R

Clinical Features of Diabulimia

Early identification of the presence of an eating disorder is important to reduce the risk of long-term morbidity. However, subclinical or clinical eating disorders are not easily diagnosed because these behaviors are often well hidden. When the presence of an eating disorder is suspected, it is crucial to pay attention to and follow subtle warning signs for

adequate evaluation. Such symptoms can be seen as low self-esteem, body dissatisfaction, anxiety, dietary manipulation[26]. Symptoms seen in eating disorders: body weight loss or fluctuating high HbA1c values, body weight, frequent diabetic ketoacidosis, symptomatic hyperglycemia early onset of diabetes complications, concealed insulin injection or evasion of injections, refusal to be weighed in clinic, limited monitoring of glucose/unwillingness to self-monitor, symptoms of depression or anxiety, changes in appetite, obsessive energy counting, failure to perform general activities, unusual eating patterns/eating habits[55]. In a study conducted in Canada with 79 adolescents with T1DM, desired ideal weight, social physique anxiety, low diabetes quality of life and low self-esteem were found to be significant determinants of eating disorders, and 34%, 51%, 57% and 64% of the youth, respectively, had behaviors have been found to be associated with these models[56].

Available Scanning Tools

Tools for early diagnosis of diabulimia require first the recognition of clinical signs suggestive of a suspected diagnosis. One of these involves a combination of possible cues, such as those resulting from manipulation of insulin therapy, and other cues resulting from the perception of body image. Conditions such as distorted body image, loss of body weight or refusal to be weighed in practice, changes in regular activities and eating patterns, changes in appetite or obsessive energy counting are frequently encountered in individuals with diabulimia[57].

Many different questionnaires, both general and specific to diabetics, are used in studies to detect eating disorders. Of these, the most commonly used for diabetics is DEPS-R. The DEPS-R is a 16-item questionnaire that assesses general and diabetes-specific eating disorder behaviors, such as body weight loss, food restriction, insulin misuse, and vomiting[58]. In the study conducted by Altınok et al., it was accepted as a valid screening tool for eating disorder behaviors in Type 1 diabetes and was stated to be potentially important for early detection[59]. Another most frequently used questionnaire for eating disorders, is the SCOFF Questionnaire. The original SCOFF questionnaire is a validated screening tool in the general population and consists of five items for eating disorders. A score ≥2 on this screening tool requires further evaluation for an eating disorder[58,60,61]. In the study of Calcaterra et al. examining unbalanced eating behaviors in young people with T1DM, a modified SCOFF questionnaire was administered to the patients in the first screening stage, and the DEPS-R questionnaire, with 4 subscales added, was administered to the children with a score of 2 points or above in the second stage. A positive correlation was found between the results of the SCOFF survey and both the new and original subscales of the DEPS-R survey[62]. Skipping meals is a very common behavior in individuals with T1DM[63]. In a study, 28% of female adolescents with T1DM and 7% of male adolescents skip meals[64]. In another study, it was stated that female adolescents with type 1 DM consumed breakfast at a lower rate than males. In men, less food intake at lunch and dinner is associated with body shape concern and energy restriction[65]. EDI −3RC, which takes approximately 5 minutes to complete. EDI-3RC includes three diabetes-related subheadings: body dissatisfaction, thinness drive, and bulimia[58]. In the study of d'Emden et al. in which they examined the eating disorder behaviors of Australian adolescents with T1DM, this questionnaire was used by

preserving its original scoring and including the insulin abuse subscale in order to be suitable for T1DM[66]. EDE-Q contains specific questions about the presence and frequency of eating disorder behaviors and body-related thoughts and feelings over the past 28 days. This 41-item self-report survey additionally includes the EDE-Q, 6 items used to assess specific behaviors related to eating disorders. Four of these items are related to dietary restriction, eating anxiety, weight gain anxiety, and shape anxiety[56]. In their study, Powers et al. examined the effect of T1DM on the answers given to the questions in the screening tools, and EDE-Q and EDI-3 questionnaires were used for this, and patients with and without diabetes completed the survey in two groups. It was found that 50.0% of the items on the EDE-Q were likely to be interpreted differently depending on whether the respondent had diabetes, compared to 6.6% on the EDI-3. This is attributed to the fact that the EDE-Q items focus specifically on eating, body weight and shape concerns, while the EDI-3 evaluates a wider range of eating disorders and concerns that are not specific to eating, body weight and shape[67]. YEDEQ is the version of the EDE-Q designed specifically for children and adolescents. It takes approximately 15-20 minutes to complete. In addition to four subscales and the overall score, it also includes specific questions about the presence and frequency of eating disorder behaviors such as restricting, binge eating, self-induced vomiting, diuretic or laxative use, and exercise for body weight loss. In a study by d'Emden et al. with adolescents with T1DM, the YEDEQ and EDI-R3 scales were compared with the chEDE screening tool. In the study, questions about incorrect insulin use for body weight control were added, without changing the original scoring of the YEDEQ questionnaire, and were similarly rated as eating disorder behavior. Analysis across both surveys demonstrated excellent internal consistency and high concurrent validity when correlating with the chEDE, which remained consistent when stratified by gender (female), younger age (13–15 years), and older adolescents (16–18 years)[45]. The Child Eating Disorder Examination (ChEDE) represents a modified child-friendly version of the EDE-Q, the gold standard diagnostic interview for eating disorders, and is approved for use in children ages 8 to 14 years[68]. It has the same four subscales as YEDEQ[68]. SEEDS was developed to identify eating disorder behaviors in those with T1DM. It is a 20-item screening tool that takes about 5 minutes to complete. Individuals are classified as having a probable subthreshold eating disorder or not having an eating disorder according to DSM-5. In their study, Powers and colleagues reported high levels of convergent validity and validity for the SEEDS tool, Diabetes Distress Screening Scale, EDE-Q, and Rosenberg Self-Esteem Scale in adolescent boys and girls[58].

Table 2. Scales used and applied groups in detecting diabulimia

Scale	Applied Group
Diabetes Eating Problems Survey-Revised (DEPS-R)	General population
SCOFF Questionnaire	General population
Eating Disorder Inventory –3 Risk Composite (EDI - 3RC)	General population
Eating Disorder Examination Questionnaire (EDE-Q)	General population
Youth Eating Disorder Examination-Questionnaire (YEDE-Q)	Children and adolescents
Child Eating Disorder Examination Questionnaire (ChEDE-Q)	Children and adolescents aged 8-14
Screen for Early Eating Disorder Signs (SEEDS)	General population
Problematic Eating Behavior Questionnaire (PEBEQ)	Children and adolescents
Eating Attitudes Test-26 (EAT-26)	Adults
Children's Eating Attitudes Test (ChEAT)	Children

Treatment of Diabuimia

Further examinations are performed when an eating disorder is suspected in an individual with type 1 diabetes. The first step towards screening and treatment is consultation and referral to mental health services. For success in eating disorder treatment, nutritional counseling, cognitive-behavioral therapy and family therapy are recommended[25]. A multidisciplinary approach with a team consisting of an endocrinologist, dietitian, psychologist and social worker is the best treatment for type 1 diabetic patients with eating disorders[8]. The intensity and complexity of the treatment are thought to have an impact on the effect of the treatment. Inpatient treatment appears to be more effective than outpatient treatment and is associated with a modest change in HbA1c results, whereas only small effects were found for outpatient psychoeducational interventions. Inpatient treatment is a complex intervention that includes multiple components, including psychoeducation, cognitive behavioral therapy, and family work. Family support can also make a significant contribution to reducing eating disorder symptoms[69]. Treatment protocols developed for anorexia and bulimia nervosa in patients with type 1 diabetes are generally ineffective[70]. Self-compassion is an approach that will improve self-management and improve psychological health for adolescents with type 1 DM. Self-compassion has been characterized as self-care and self-understanding, taking an active role in existence and accepting that imperfection and pain are part of being human[71]. In their study, Eisenberg and colleagues examined the potential interaction of controlled motivation with self-efficacy and found that directly changing controlled motivation or reducing the effect of controlled motivation on eating disorder behaviors by increasing self-efficacy are two potential ways to reduce these behaviors for individuals with T1DM with eating disorders stated[72].

Dietitians have challenging tasks in this regard, such as educating patients about diabetes and eating disorders, preparing nutrition plans, and determining desired body weight targets for patients and families. When the patient's daily energy intake increases, insulin doses need to be adjusted according to the amount of food consumed to prevent hypergliemia. Multiple daily injections using insulin/carbohydrate ratios allow greater flexibility in food amounts and meal times. However, it requires more blood sugar

monitoring and insulin injections. As an individual's physical and psychological health improves, it may be beneficial to plan their diet more flexibly. All healthcare professionals should be aware of concerns and changes in body weight in adolescents with T1DM. It should also be known that body weight loss may be related to glycemic control[8]. The lack of a consensus among healthcare professionals regarding the diagnostic criteria of diabulimia and the society's lack of knowledge and awareness about diabulimia negatively affect the treatment[73]. Since diabulimia is common in patients with T1DM, diagnosis is delayed, regular screening of these patients for the risk of depression, anxiety and eating disorders can provide early diagnosis[74].

Conclusion and Recommendations

Eating disorder behaviors may be seen more frequently in patients with T1DM, especially in women, than in patients without diabetes. These behaviors significantly impact the physical and emotional health of individuals with diabetes and are associated with an increased risk of medical complications, including impaired metabolic control and higher mortality rates. Treatment methods are not definitive and studies still need to be done. Diabulimia is a significant health problem that is a combination of T1DM and eating disorders. Significant developments in the diagnosis and treatment of diabulimia are expected to occur in the future. Diabulimia screening is important for early diagnosis and treatment due to the fatal complications that diabulimia can cause in diabetic patients. The patient must be treated with a multidisciplinary team work. Important risk factors such as body weight loss, glycemic control and psychological status should be monitored. For this reason, it is of great importance to educate the patient's family and himself about this issue. Patients should be ensured to go for regular check-ups. Awareness about this issue should be increased.

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The Negative Footprint Illusion: Why Our 'Green' Choices Might Not Be So Green?

Gizem UZLU DOLANBAY*, Hilal YILDIRAN**

Abstract

The Negative Footprint Illusion (NFI) is a cognitive bias that leads individuals to falsely assume that adding an environmentally friendly product or behavior reduces the overall environmental impact. This illusion distorts sustainability assessments, as people rely on averaging bias, compensatory green beliefs (CGB), framing effects, and quantity insensitivity instead of objectively evaluating total environmental impact. This review examines NFI as a cognitive barrier to sustainable nutrition, exploring its underlying mechanisms and their role in shaping environmental decision-making. Empirical evidence highlights how individuals miscalculate their carbon footprint, particularly in food consumption and energy-related decisions and how perceptual biases reinforce this illusion. Addressing these biases through strategic sustainability communication and evidence-based decision-making frameworks is crucial for fostering truly sustainable consumption behaviors.

Keywords: Negative footprint ıllusion, averaging bias, sustainable consumption, green halo effect, cognitive bias, compensatory green beliefs.

Negatif Ayak İzi Yanılsaması: 'Yeşil' Seçimlerimiz Gerçekten O Kadar Yeşil mi?

Öz

Negatif Ayak İzi Yanılsaması (NAİY), bireylerin çevre dostu bir ürün veya davranış eklediğinde toplam çevresel etkinin azaldığını yanlış bir şekilde varsaymasına neden olan bilişsel bir yanılgıdır. Bu yanılsama, sürdürülebilirlik değerlendirmelerini sistematik olarak çarpıtarak bireylerin toplam çevresel etkiyi nesnel bir şekilde değerlendirmesi yerine ortalama alma yanılgısı, telafi edici yeşil inançlar (TEYİ), çerçeveleme etkisi ve miktar duyarsızlığı gibi faktörlere dayanmasına yol açar. Bu derleme, NAİY'yi sürdürülebilir beslenme açısından kritik bir bilişsel engel olarak ele almakta ve bu yanılsamanın temel mekanizmalarını, çevresel karar alma süreçleri üzerindeki etkilerini kapsamlı bir şekilde analiz etmektedir. Ampirik bulgular, bireylerin özellikle besin tüketimi ve enerjiyle ilgili kararlar sırasında karbon ayak izlerini yanlış hesapladığını ve algısal yanılgıların bu yanılsamayı nasıl güçlendirdiğini göstermektedir. Bu yanılgıların azaltılması, etkili sürdürülebilirlik iletişimi ve kanıta dayalı karar alma çerçeveleri ile mümkündür ve gerçekten sürdürülebilir tüketim davranışlarını teşvik etmek için hayati bir gerekliliktir.

Anahtar Sözcükler: Negatif ayak izi yanılsaması, ortalama alma yanılgısı, sürdürülebilir tüketim, yeşil hale etkisi, bilişsel yanılgılar, telafi edici yeşil inançlar.

Introduction

Sustainability, encompassing environmental, economic, and social dimensions, aims to protect human health and ecosystems while ensuring a livable world for future

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generations[1]. In this context, integrating sustainability principles into lifestyles is crucial, particularly in food systems, where environmental, economic, and social impacts must be considered. Sustainable nutrition is at the heart of this approach[1], a dietary model that promotes human health and preserves natural resources, maintaining environmental balance. According to the Food and Agriculture Organization (FAO), "Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair, and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources."[2].

The significance of sustainable nutrition becomes increasingly evident in the face of global challenges such as a growing population, climate change, and resource depletion. According to the United Nations, the world population is projected to reach 9.7 billion by 2050[3]. The FAO estimates that feeding this expanding population will require an overall increase of approximately 70% in global food production between 2005/07 and 2050[4]. Consistent with this, the Intergovernmental Panel on Climate Change (IPCC) emphasizes that a sustainable future, including a sustainable food system, is one of the most pressing issues of this era[5].

Food production systems are a major contributor to greenhouse gas (GHG) emissions and place immense pressure on limited natural resources such as water and soil[6]. In fact, food production alone is responsible for 15-30% of total GHG emissions, making it a key driver of global warming[6,7]. According to the 1990-2021 Greenhouse Gas Emission Statistics of the Turkish Statistical Institute (TÜİK), Türkiye's total GHG emissions have risen, reaching 6.7 tons of CO_2 equivalent per capita. Among all sectors, the highest increase in GHG emissions was observed in the agricultural sector (56.5%), followed by the waste sector (32.6%)[8]. This data highlights the urgent need to adopt more sustainable food production and waste management practices to mitigate environmental impact.

Additionally, household consumption is estimated to contribute to more than 60% of global GHG emissions, underscoring the urgent need for sustainable eating behaviors at both individual and societal levels[9,10]. The adoption of a more sustainable diet is not only crucial for environmental sustainability, but is also a key public health issue[11]. Even small, daily behavioral changes can have a significant positive impact on environmental outcomes. Making informed food choices and adopting sustainable eating behaviors will help individuals mitigate climate change, preserve natural resources, and ensure global food security. This underlines the importance of individuals taking environmental responsibility and actively working toward a sustainable future[12,13]. Sustainable eating behaviors are vital as they offer the potential to minimize both health and environmental impacts while promoting nutrient-rich, sustainable, and eco-friendly dietary habits[14]. Overall, sustainable eating behaviors are essential in addressing the growing challenges of food production and consumption while simultaneously supporting both human health and environmental well-being[15].

However, economic, social, and cognitive barriers hinder the transition to sustainable nutrition. Sustainable food products are often more expensive and may have limited availability in certain regions. Cultural dietary habits can make it difficult for individuals

to modify their food choices. Additionally, cognitive biases, such as misjudging environmental impacts, can undermine sustainable eating efforts[16,17]. Individuals often struggle to accurately assess their behaviors' environmental impact. Certain activities, such as meat consumption and air travel, are often underestimated in terms of their environmental impact, whereas actions like avoiding plastic bags tend to be overestimated[10]. These misjudgments can hinder the adoption of sustainable eating behaviors, highlighting the role of cognitive biases in sustainability-related decision-making.

Cognitive biases, which lead to deviations from rational decision-making and judgment processes, can distort individuals' perceptions of food consumption and its environmental impacts. Research indicates that these biases may cause systematic errors in individuals' sustainable food choices and even reinforce unsustainable consumption behaviors within group settings[16,18]. One of the most significant cognitive barriers to sustainable nutrition is the Negative Footprint Illusion (NFI). This illusion leads individuals to believe that adding environmentally friendly food choices offsets the negative environmental impact of other, less sustainable choices, creating the false perception that their diet is more sustainable than it actually is[19] Moreover, cognitive biases can skew individuals' perceptions of their sustainable eating choices, leading to misjudgments about their actual environmental impact—such as assuming that the presence of an eco-friendly label on certain foods makes their entire diet sustainable[20]. Cognitive distortions in environmental communication can shape individuals' attitudes and perceptions toward sustainable behaviors[21]. This review aims to examine NFI as a cognitive barrier to sustainable nutrition by providing an in-depth analysis of the mechanisms underlying this illusion.

Material and Methods

This review systematically examines research on the NFI through a comprehensive literature search. The literature review was conducted using academic databases such as Web of Science, Scopus, and PubMed, with "Negative Footprint Illusion" as the sole keyword to ensure specificity in the selection process. Given that no prior studies explicitly investigated NFI before 2016, this review includes experimental and observational studies published between January 2016 and February 2025 and written in English. The selected studies were categorized based on the type of experimental design (within-participant, between-participant), sample size and demographic characteristics, research context (nutrition, transportation, energy consumption, marketing), and core cognitive mechanisms (averaging bias, compensatory green beliefs, framing effect, and quantity insensitivity). The findings were synthesized within the framework of NFI's cognitive mechanisms, its effects on sustainable consumption, and how it manifests in different contexts. Based on these criteria, 15 peer-reviewed studies were evaluated and presented in Table 1.

Negative Footprint Illusion (NFI)

Negative Footprint Illusion (NFI) is a cognitive bias that leads individuals to mistakenly believe that adding an environmentally friendly product or behavior reduces the total environmental impact. This illusion leads individuals to make systematic errors in their

evaluation of total environmental impact, assuming that the inclusion of a sustainable component offsets the harm caused by less sustainable choices[19]. However, a product or behavior perceived as sustainable does not completely eliminate environmental costs; it merely reduces them.

NFI is a part of a broader categorization effect, which arises from the human cognitive system's tendency to engage in categorical thinking[22]. Studies indicate that this illusion is robust across various domains, including food consumption[19,23], transportation[24] and building sustainability[25,26].

One factor influencing the strength of NFI is how individuals assess environmental impacts. Specifically, studies have shown that the illusion becomes stronger as the number of environmentally friendly components within a group increases[27]. These findings suggest that people tend to rely on averaging rather than summation when estimating total environmental impact. In other words, when evaluating a group containing both sustainable and conventional elements, individuals do not sum the carbon footprints of each component separately but instead take an average, leading to an underestimated total impact. This illusion is a cognitive distortion that directly influences environmental decision-making and is shaped by various psychological and social mechanisms. These cognitive processes shape individuals' sustainability perceptions and lead to systematic biases in environmental impact assessments.

Cognitive Factors

Compensatory Green Beliefs (CGB): It refers to a cognitive bias in which individuals believe that certain environmentally friendly choices can compensate for the negative effects of less sustainable ones. This misconception can lead people to an underestimation of the actual impact of sustainable food consumption, causing individuals to miscalculate their total environmental footprint[19]. A key reason behind CGB is the tendency to perceive environmental harm as a fixed budget—where individuals believe that engaging in "green" consumption behaviors neutralizes the impact of unsustainable choices[28]. As a result, people may develop a false sense of sustainability, thinking they are making a meaningful difference when their overall carbon footprint remains largely unchanged[19]. This bias is closely related to NFI, as individuals who assume that sustainable choices balance out unsustainable ones are more likely to miscalculate their total environmental impact[28]. The combined effects of CGB and NFI may hinder individuals from making more sustainable food choices. Ultimately, these biases can cause individuals to overlook the impact of their unsustainable behaviors and develop a false sense of security, leading to increased consumption rather than actual reductions in environmental harm.

Averaging Bias: Averaging bias refers to the tendency of individuals to assess the environmental impact of a group of products as an average rather than summing the individual impacts. One key factor influencing cognitive bias leads to the erroneous belief that a sustainable product's presence reduces an entire setting's total environmental footprint. The strength of NFI is how individuals assess environmental impacts[26]. Experimental studies have demonstrated that individuals perceive the presence of a sustainably labeled product as a factor that makes an unsustainable product appear more

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environmentally friendly, leading to an underestimated total impact[19,25,29]. This mechanism underlies the NFI, leading individuals to mistakenly believe that incorporating a low-carbon component offsets the impact of a high-carbon component. For instance, the addition of an organic side dish to a red meat dish may create the illusion of a reduced total carbon footprint, despite the overall impact remaining unchanged or even increasing [19].

Lack of Information and Misperceptions: Lack of information and misperceptions play a crucial role in how individuals evaluate environmental impacts. Findings indicate that most individuals do not fully understand the relationship between diet and environmental effects, often miscalculating the carbon footprint of their food choices[23,30]. This misjudgment leads individuals to overlook the actual environmental impact of their food choices when making sustainable food consumption decisions. In particular, individuals tend to focus solely on the presence of sustainable products, disregarding the overall environmental impact of their whole dietary habits and total consumption levels[19,23]. Consequently, they may assume that selecting certain products labeled as "sustainable" significantly reduces the carbon footprint of their whole diet. This cognitive error is one of the primary factors contributing to NFI, as it systematically distorts individuals' environmental impact evaluations, making sustainability goals more challenging to achieve.

Green Halo Effect: The Green Halo Effect is a cognitive bias in which a product or behavior is perceived as fully sustainable simply because it possesses some environmentally friendly attributes[31]. This illusion leads individuals to disregard other environmental impacts of products labeled as sustainable. Research indicates that consumers often overestimate the environmental benefits of eco-labeled products while neglecting to account for their full lifecycle impact[32]. This cognitive bias fosters a misleading sense of confidence in one's sustainable choices, leading individuals to assume that a single environmentally friendly product or behavior extends to their entire consumption pattern. The Green Halo Effect has a significant influence on sustainable food choices. Consumers may mistakenly believe that the purchase of food items marketed as ethical or environmentally friendly automatically makes their overall diet sustainable. For instance, an individual purchasing organic meat may disregard the environmental costs associated with meat consumption, incorrectly perceiving their choice as entirely eco-friendly[33]. When combined with the NFI, this bias reinforces the mistaken belief that making a few sustainable choices compensates for unsustainable behaviors, leading to misjudgments in overall environmental impact.

Negative Calorie Illusion: The Negative Calorie Illusion refers to a cognitive bias in which individuals believe that consuming a healthy food item alongside a high-calorie item reduces the total caloric intake. This bias arises from individuals' tendency to categorize foods into virtue (healthy, low-calorie) and vice (unhealthy, high-calorie) categories[22]. For instance, when a burger is consumed alongside a salad, individuals may mistakenly believe that the overall calorie intake is lower than it actually is. In reality, although the total calorie intake increases, individuals perceive the combination as a balanced choice, reinforcing the illusion that they are making a healthier decision overall[34]. A similar cognitive mechanism is observed in NFI[25,35]. Consumers may assume

that adding a sustainable product or component offsets the The impact of an environmentally harmful product can lead to an underestimation of the total environmental footprint.

Rebound Effect: The Rebound Effect occurs when individuals engage in an environmentally friendly behavior and subsequently compensate for it by increasing their overall consumption, believing that their initial action has offset any negative impact[36]. This mechanism is directly linked to NFI, as individuals may believe that making a sustainable choice significantly reduces their environmental impact, leading them to underestimate their total footprint. The rebound effect can be categorized into direct and indirect effects. Direct rebound effects occur when improvements in energy efficiency lead individuals to use the service more frequently. For instance, someone who purchases a fuel-efficient car may drive longer distances, offsetting the potential environmental benefits. Indirect rebound effects occur when savings from sustainable actions are redirected toward environmentally costly activities, such as using the money saved from fuel efficiency to take a longer vacation with high carbon emissions from air travel[37]. Both types of rebound effects contribute to the perception of moral licensing, where individuals feel justified in engaging in environmentally harmful behaviors after making a sustainable choice[37]. In the context of food consumption, individuals who consume sustainable foods may develop the belief that they are significantly reducing their environmental impact, leading them to increase their total food consumption. This perception ultimately hinders the adoption of truly sustainable dietary habits and may increase overall environmental burden instead of reducing it[38].

Affect Heuristic: Consumers often make decisions about environmentally friendly products based on emotional and intuitive responses rather than analytical reasoning, a process known as the Affect Heuristic[39]. This heuristic leads individuals to judge a product's sustainability based on superficial attributes, such as its label, color, packaging, or marketing language, rather than evaluating its actual environmental impact[32]. The reliance on affective cues rather than objective analysis can distort sustainability perceptions, further reinforcing NFI.

Social Factors

Societal Diet Norms: Popular diet trends and cultural expectations play a significant role in shaping individuals' dietary choices. Social norms may encourage individuals to choose foods perceived as sustainable; however, these norms do not always align with actual sustainability[40]. In particular, the rapid spread of sustainability trends through social media can encourage individuals to adopt specific dietary models without critically evaluating their environmental impact, as seen in the case of plant-based diets or superfoods marketed as "eco-friendly," which may lead individuals to underestimate the overall environmental footprint of their dietary choices[19,23]. Research suggests that younger consumers are more influenced by sustainability trends on social media[41]. This phenomenon may make younger individuals more susceptible to NFI, as they may believe that adopting certain diets promoted within their social circles automatically makes their overall dietary patterns more sustainable. As a result, they may miscalculate their total carbon footprint, assuming that these choices significantly reduce their environmental impact.

Social Pressures: Social environment is among the key social pressures that shape individuals' sustainable food choices. People may choose sustainable foods to to make a positive impression[40]. However, some diet choices encouraged by social circles may, in reality, lead to greater environmental harm than expected[42]. These social pressures can reinforce the belief that sustainable choices compensate for other unsustainable behaviors[43]. Consequently, individuals may unknowingly make decisions under the influence of NFI, miscalculating their total environmental impact.

Studies on the NFI

Studies on NFI demonstrated that consumers frequently misjudge environmental impacts, and these miscalculations significantly influence purchasing decisions[19,23-29,35]. This cognitive bias has been observed and extensively studied in various contexts, including food consumption, transportation, and energy use. The literature highlights that NFI causes individuals to misjudge environmental impacts, which in turn negatively influences sustainable consumption behaviors.

In the context of nutrition and food choices, research has shown how individuals misinterpret products marketed as organic and environmentally friendly. For example, consumers may make misleading choices by assuming that products with green labels significantly reduce their carbon footprint[19]. The methodological approaches and key findings of studies addressing NFI across different domains are summarized in Table 1.

Table 1. Summary of studies investigating the Negative Footprint Illusion (NFI)

	Experiment	Objective	Sample	Experimental Design	Main Findings
Andersson et al.(2024)[27]	**Experiment a**	To test whether the NFI increases with the number of "green" items added to a fixed set of conventional items.	n = 66 (General population, 67% female, mean age = 31.15 ± 10.74 years)	Within-participant	The magnitude of NFI increased as more green items were added to a fixed set of conventional items, supporting the averaging-bias account. Participants perceived a greater reduction in environmental impact when the number of green additions was large rather than small.
	Experiment b	To test whether response scale design influences the NFI and whether participants misinterpret green items as having zero carbon emissions.	n = 128 (General population, 59% female, mean age = 33.68 ± 12.41 years)	Within-participant	The NFI was only observed when a large number of green additions were present, while smaller additions resulted in a zero-footprint illusion. A significant portion of participants correctly recognized that green buildings still had a carbon footprint, suggesting that the illusion is not driven solely by misinterpretation of green buildings as carbon neutral.
	Experiment c	To examine whether category size (i.e., the total number of items) affects the magnitude of NFI, independent of the proportion of green vs. conventional items.	n = 150 (General population, 61% female, mean age = 34.62 ± 11.70 years)	Between-participant	NFI magnitude increased as category size increased, even when the ratio of green to conventional items remained constant. This finding contradicts the pure averaging-bias explanation and suggests that a category-size bias also contributes to NFI.
Gorissen et al. (2024)[44]		To investigate whether framing environmental impact ratings in terms of eco-friendliness ("green" framing) versus environmental damage ("grey" framing) influences the NFI.	n = 396 (General population, 42.68% female, mean age = 43.78 ± 14.02 years)	Between-participant	The NFI was observed only in the "green" framing condition, where environmental impact was rated in terms of eco-friendliness. No significant effect was found in the "grey" framing condition. Environmental concern was positively associated with NFI susceptibility in the green condition.
Sörqvist & Marsh (2024)[45]		To examine the role of attribute substitution in the NFI and assess whether environmental friendliness and environmental damage judgments produce different effects.	n = 59 (University students, 70% women, 70% female, mean age = 26.04 ± 7.20 years)	Within-participant	NFI is driven more by attribute substitution than by scale framing, meaning participants rely on simpler heuristics rather than an in-depth evaluation of environmental impact. Environmental friendliness and damage judgments produced similar patterns, contradicting prior research. NFI persisted regardless of whether

				participants evaluated positive (green) or negative (damage) attributes.
Sörqvist et al. (2022)[46]		To investigate whether spatial (ir)regularity influences the magnitude of the NFI in environmental impact judgments.	n = 160 (18–30 years of aged participants, 65.6% female, mean age = 23.21 ± 3.67 years)	Within-participant	Irregular spatial distribution increased the NFI, as participants relied on perceived numerosity rather than actual quantity when estimating carbon footprint.
Threadgold et al. (2022)[47]	**Experiment a**	To examine individual differences in susceptibility to the NFI, focusing on environmental concerns, compensatory green beliefs, and reflective reasoning.	n = 120 (General population, 40% female, mean age = 36 ± 13 years)	Within-participant	NFI was observed for buildings but not for apples. Susceptibility to the illusion was unrelated to environmental concerns or compensatory green beliefs. Actively open-minded thinking weakly predicted reduced susceptibility to NFI in the buildings condition.
	Experiment b	To replicate and extend experiment 1, testing whether the illusion generalizes to cars and whether a revised CGB scale predicts susceptibility.	n = 269 (General population, 35% female, mean age = 31 ± 11 years)	Within-participant	NFI was observed for buildings and cars but not for apples. Environmental concerns and CGB did not predict susceptibility. Higher actively open-minded thinking scores were associated with reduced NFI susceptibility for buildings and cars.
Sörqvist & Holmgren (2022)[29]		To examine whether the NFI persists when using a ratio scale and whether response time pressure influences the effect.	n = 102 (General population, 70% female, mean age = 34.25 ± 10.94 years)	Mixed-design (both within-participant and between-participant)	The NFI was stronger when estimates were made on an ordinal scale and under time pressure. When using a ratio scale, the illusion was weaker. The effect was also confirmed in a within-participant design, contradicting earlier studies suggesting that it only appears in between-participant designs.
Holmgren, Andersson, Ball, & Marsh (2021)[39]	**Experiment a**	To examine whether summative priming can reduce the NFI in environmental impact judgments.	n = 60 (University students, 63% female, mean age = 28.52 ± 10.04 years)	Between-participant	Participants who were exposed to a summative priming task prior to making environmental impact judgments showed a significant reduction in the NFI compared to the control group. However, limitations in the priming task and potential confounds required further refinement.
	Experiment b	To refine the summative priming method and test its effectiveness across different environmental contexts, addressing the methodological limitations of experiment a.	n = 265 (General population, 67.2% female, mean age = 34.54 ± 11.74 years	Between-participant	Summative priming reduced the NFI, while summative priming strengthened it, confirming that averaging bias underlies the illusion. Improved priming procedures and better control for confounding factors enhanced the reliability and generalizability of the findings.
	Experiment c	To test whether a fully domain-general summative priming task can eliminate the NFI, further refining the methods from experiment b.	n = 319 (General population, 67.4% female, mean age = 34.98 ± 12.39 years)	Between-participant	Summative priming fully eliminated NFI, supporting a domain-general explanation of the effect. Methodological concerns from Experiment b were addressed, demonstrating that priming effects extended beyond specific environmental contexts.
	Experiment d	To assess whether neutral cognitive engagement (non-mathematical priming) is sufficient to eliminate NFI.	n = 102 (General population, 62% female, mean age = 31.56 ± 11.05 years)	Between-participant	A neutral priming task (where participants engaged in non-mathematical reasoning, such as color selection) failed to eliminate NFI, confirming that mathematical reasoning is necessary to override the averaging bias. This suggests that general cognitive engagement alone is not enough to mitigate NFI.
Ateş (2020)[48]		To examine pre-service science teachers' perceptual biases regarding sustainable food consumption and the presence of NFI.	n = 165 (Pre-service science teachers, 64.85% female)	Within-participant	Participants perceived the 'sustainable-addition condition' as having a lower environmental impact than the 'standard menu condition,' despite its objectively higher footprint. NFI persisted across different rating scales, indicating that pre-service science teachers exhibit perceptual biases in sustainable food consumption, even with sufficient environmental knowledge.
MacCutcheon et al. (2020)[28]		To investigate whether individual differences in CGB predict susceptibility to the NFI.	n = 112 (General population, 41.1% female, mean age = 39.4 ± 15.37 years)	Within-participant	Individuals with higher CGB were found to be more susceptible to the NFI, as buildings labeled as 'green' were perceived to reduce the total carbon footprint.
Holmgren et al. (2019)[49]	**Experiment a**	To examine the presence of the NFI in people's mental models of CO_2	n = 20 (University students, 50% female, mean	Within-participant	Participants believed that a high emission period followed by a low emission period contributed less CO_2 to the atmosphere than a high

		accumulation in the atmosphere.	age = 26.15 ± 4.48 years)		emission period alone, demonstrating the NFI.
	Experiment b	To test whether an averaging bias underpins the NFI in CO_2 accumulation judgments.	n = 47 (University students, 47% female, mean age = 29.32 ± 7.84 years)	Within-participant	Participants estimated the total CO_2 contribution based on the average of emissions rather than the accumulated sum, supporting the role of averaging bias.
	Experiment c	To test whether the NFI in CO_2 accumulation judgments is influenced by symbolic wording in the problem statement.	n = 29 (University students, 21% female, mean age = 25.14 ± 7.84 years)	Within-participant	The NFI persisted even when wording related to sustainability interventions was removed, indicating that the bias is robust to framing effects.
Kusch & Fiebelkorn (2019)[23]		To examine the presence of the NFI and Quantity Insensitivity in environmental impact judgments of meat, vegetarian, and insect burgers.	n = 501 (General population, 48.9% female, mean age = 47.8 ± 16.8 years)	Between-participant	Participants did not differentiate between the environmental impact of a vegetarian or insect burger and a meal without a burger, while a meat burger increased the footprint rating, demonstrating NFI. Quantity insensitivity was observed, as participants reacted only to burger type rather than number. Green consumer values had no significant effect on footprint estimations.
Holmgren et al. (2018)[25]	**Experiment a**	To examine whether the NFI occurs in environmental impact estimates of green and conventional buildings.	n = 90 (University students, 56% female, mean age = 26.31 ± 6.56 years)	Between-participant	Participants estimated the total carbon footprint as lower when green buildings were added to conventional buildings, despite the actual footprint increasing.
	Experiment b	To test whether the NFI is driven by an averaging bias in environmental impact judgments.	n = 79 (University students, 56% female, mean age = 26.33 ± 7.69 years)	Between-participant	Participants estimated the carbon footprint of a mix of green and conventional buildings as the average of their individual estimates rather than the sum, confirming the role of averaging bias in the illusion.
Holmgren et al. (2018)[26]		To investigate whether expertise in energy systems reduces susceptibility to the NFI	n = 55 (22 energy experts (expert group), 33 undergraduate students (novice group), 42% female, mean age = 27.58 ± 6.18 years)	Within-participant	Both experts (energy systems graduates) and novices estimated a lower environmental impact when green buildings were added to conventional buildings, demonstrating the NFI. Expertise did not reduce susceptibility to the bias.
Kim & Schuldt (2018)[24]	**Experiment a**	To examine whether individuals exhibit quantity insensitivity when judging the environmental impact of green vs. conventional products.	n = 370 (Online sample from Amazon Mechanical Turk, 52.2% female, mean age = 40.25 ± 13.58 years)	Between-participant	Participants judged two conventional vehicles as having a greater environmental impact than one, but did not perceive a difference between one and two hybrid vehicles, demonstrating quantity insensitivity for green products.
	Experiment b	To test whether ecological values moderate quantity insensitivity in judgments of environmental impact.	n = 370 (Same sample)	Between-participant	No evidence of moderation was found; individuals with stronger ecological values exhibited the same quantity insensitivity as those with weaker ecological values.
Gorissen & Weijters (2016)[19]	**Experiment a**	To test the existence of the NFI in sustainable food choices.	n = 536 (General population, 48.3% female, mean age = 43.7 ± 12.7 years)	Between-participant	Participants judged meals with an organic side dish to have a lower environmental footprint than the same meal without the side dish, supporting the NFI.
	Experiment b	To examine the effect of different rating scale formats (evaluative vs. quantitative) on the NFI.	n = 580 (General population, 59.3% female, mean age = 40.5 ± 11.5 years)	Between-participant	The illusion persisted regardless of scale format, but color-coded evaluative scales elicited stronger categorical thinking, reinforcing the bias.
	Experiment c	To test whether organic labeling alone can induce the NFI.	n = 219 (University students, 89% female, mean age = 21.4 ± 1.74 years)	Between-participant	The organic-labeled yogurt was rated as having a lower footprint than the same yogurt without the label, suggesting that the illusion is at least partly driven by labeling.
	Experiment d	To determine whether the NFI persists in a within-participant design.	n = 477 (Online sample from Amazon Mechanical Turk, 47.4% female, mean age = 37.2 ± 11.9 years)	Within-participant	The illusion did not appear when participants rated multiple meals in a comparative setting, suggesting that relative comparisons may help mitigate the effect.

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Studies have shown that the NFI arises from systematic cognitive biases that effect how individuals evaluate environmental impacts[23-29,44-49]. Individuals often miscalculate the total environmental impact of products they perceive as sustainable, with various cognitive mechanisms contributing to this misjudgment. Averaging bias[19,24-29,39], framing effect[44], CGB[19,28], quantity insensitivity[23,24], perceptual bias[48], category-size bias[27] and the green halo effect[19,24] are among the key mechanisms underlying NFI.

One of the most common explanations for NFI is averaging bias. When evaluating mixed-content items, individuals tend to make assessments based on the average impact of components rather than considering the total environmental effect. It demonstrated that individuals assess products with both positive and negative attributes by focusing on the average effect rather than summing the impact[22]. In one experiment, participants were presented with scenarios involving items with "virtuous" (morally positive) and "vice" (morally negative) attributes, and their evaluations reflected an averaging tendency rather than a summation of effects. For instance, when a high-calorie meal includes a healthy component (such as a broccoli salad), individuals underestimate the total calorie count, believing that the meal has become significantly healthier. This tendency is also observed in environmental sustainability assessments, making NFI one of the primary cognitive mechanisms shaping individuals' evaluations of environmental impact. Individuals assume that adding a sustainable component to an unsustainable system directly reduces the total impact, leading to systematic miscalculations.

Numerous studies have investigated the relationship between NFI and averaging bias. Gorissen & Weijters have shown that participants systematically underestimate the total carbon footprint of meals containing sustainable accompaniments. Further research by the same researchers showed that non-numerical, colour-coded rating scales increased NFI compared to numerical scales[19]. Holmgren et al. observed in Experiment b that when participants evaluated a combination of eco-friendly and conventional buildings, they displayed an averaging tendency, estimating a lower total carbon footprint than the actual impact[25]. Andersson et al. found that increasing the number of green products within a set strengthens NFI in experiment a. However, Andersson et al. revealed in Experiment b that although individuals did not explicitly perceive green products as having zero carbon emissions, NFI only emerged when a large number of green items were present. In Experiment c, Andersson et al. demonstrated that NFI intensifies with category size, suggesting that category-size bias interacts with averaging bias[27]. Additionally, Holmgren et al. showed in Experiment 2 that individuals rely on averaging heuristics when estimating CO_2 emissions, leading to miscalculations in high-low emission scenarios[49]. The way environmental information is framing effect also plays a crucial role in NFI, as the way information is presented significantly influences individuals' decision-making processes. Gorissen et al. demonstrated that NFI was more pronounced when environmental impact was framed positively ("eco-friendliness") rather than negatively ("harmful effects")[44]. However, Sörqvist & Marsh found no significant difference between framing conditions, suggesting that NFI may not solely result from framing but also from attribute substitution effects[45].

Another major cognitive mechanism contributing to NFI is CGB, which refers to the tendency of individuals to believe that environmentally friendly choices can offset the

impact of unsustainable ones. MacCutcheon et al. found in Experiment a that individuals with higher CGB levels were more prone to NFI, believing that buildings labeled as 'green' significantly reduced total carbon emissions. Interestingly, environmental concern does not necessarily reduce NFI susceptibility[28]. Threadgold et al. found no significant correlation between environmental awareness and NFI, suggesting that even individuals who actively engage in sustainable behaviors can miscalculate their environmental impact[47]. Similarly, Ateş[48] and Holmgren et al.[26] observed that NFI persisted even among highly educated individuals, highlighting that environmental literacy does not necessarily protect against this illusion. Holmgren et al. further demonstrated that even energy systems experts incorrectly assumed that adding green buildings to a conventional structure reduced total emissions, suggesting that expertise alone does not eliminate NFI[26].

Another factor linked to NFI is quantity insensitivity, where individuals disregard the impact of consumption quantity when assessing environmental effects. Kim & Schuldt found in Experiment a that participants estimated the environmental impact of two conventional vehicles as higher than one but did not perceive a difference between one and two hybrid vehicles, indicating a failure to account for total quantity in their judgments[24]. Similarly, Kusch & Fiebelkorn found that participants underestimated the environmental impact of sustainable ingredients in meals, neglecting the overall consumption volume[23].

Additionally, perceptual biases also play a role in NFI. Sörqvist et al. found that spatial irregularity in visual displays increased NFI by altering perceived numerosity[46]. Holmgren et al. demonstrated in Experiment a that participants believed a high-emission period followed by a low-emission period contributed less to total CO_2 accumulation than a continuous high-emission period, despite the actual impact being the same[49].

Several studies have explored strategies to reduce the effects of NFI. Holmgren et al. tested summative priming as a strategy to reduce NFI with three experiments, finding that while summative priming decreased NFI, averaging priming reinforced it. These findings suggest that developing cognitive strategies that encourage individuals to focus on summation rather than averaging may help improve environmental impact assessments[39].

Overall, these studies demonstrate that NFI emerges across various contexts and is driven by multiple cognitive mechanisms. These findings highlight the need for greater transparency in sustainability communication and structured information presentation to help consumers make more informed decisions regarding their environmental footprint.

Conclusion

In conclusion, research demonstrates that NFI emerges across various domains and is driven by multiple cognitive mechanisms, including averaging bias, framing effects, compensatory green beliefs, quantity insensitivity, and perceptual distortions. These biases lead individuals to systematically miscalculate their environmental impact, making it more challenging to make truly sustainable choices. To combat NFI, greater

transparency in sustainability communication is essential. Providing consumers with structured, data-driven sustainability assessments—rather than relying on general eco-labeling—could help improve environmental decision-making and reduce misjudgments related to sustainable consumption.

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Kanserin Önlenmesinde ve Tedavisinde Güncel Beslenme Yaklaşımları

Rabia Melda KARAAĞAÇ*, Indrani KALKAN**

Öz

Kanser hücrelerin kontrolsüzce bölünmesiyle meydana gelen bir hastalık grubudur. Son zamanlarda prevalansı dünyada ve ülkemizde atmakta olan kanser önde gelen ölüm nedenlerindendir. Meme, akciğer, kolon ve rektum ve prostat kanserleri en sık görülen kanser türlerindendir. Kanser oluşum nedenlerine bakıldığında hem genetik hem de çevresel etmenlerden etkilendiği görülmektedir. Gerek tanı öncesi gerekse tedaviye başlandıktan sonra kanser hastalarında beslenmenin önemi büyüktür. Kanser tedavisinde, cerrahi, kemoterapi, radyoterapi, kemoradyoterapi ve immünoterapi gibi birçok yöntem kullanılmaktadır. Tedavi sürecinde hasta tedavinin şekline ve seyrine bağlı olarak birçok beslenme problemi ile karşılaşmaktadır. Örneğin malnütrisyon kanser hastalarında oldukça sık görülen problemlerden bir tanesidir. Özellikle yağsız doku kaybına neden olarak vücut direncini düşürmektedir. Ayrıca anti-kanser tedavisi sürecinde yan etkiler doğurarak iyileşme sürecini olumsuz etkilediği bildirilmektedir. Kanserde optimal beslenme tedavisi sık araştırılan konulardandır ancak halen belirsizliğini korumaktadır. Günümüzde, hem kanseri önleme hem de kanser tedavisinde çeşitli beslenme yaklaşımları gündeme gelmektedir. Bu yaklaşımlardan bazıları, oral nütrisyonel suplement kullanımı, ketojenik diyet uygulaması, probiyotik kullanımı ve fonksiyonel besin uygulamalarıdır. Bu önleme ve tedavi yaklaşımlarına yönelik kanıtlar tartışmalı olmasına rağmen umut vaat etmektedir. Kanser hastalığı hassas bir süreç olduğundan beslenme yaklaşımlarının hastada yan etki oluşturmayacak bir biçimde uygulanmasına dikkat edilmelidir. Bu derlemenin amacı, kanserin önlenmesinde ve tedavisinde güncel beslenme yaklaşımlarını literatür bilgileri ışığında incelemektir.

Anahtar Sözcükler: Kanser, beslenme, diyet tedavisi.

Current Nutritional Approaches in the Prevention and Treatment of Cancer

Abstract

Cancer is a group of diseases that occur when cells divide uncontrollably. Cancer is one of the leading causes of death worldwide, with its prevalence rising both globally and in our country. Breast, lung, colon and rectum and prostate cancers are among the most common types of cancer. Cancer development is influenced by both genetic and environmental factors. Nutrition is of great importance in cancer patients, both before diagnosis and after treatment. Many methods such as surgery, chemotherapy, radiotherapy, chemoradiotherapy and immunotherapy are used in cancer treatment. During the treatment process, the patient encounters many nutritional problems depending on the form and course of the treatment. Malnutrition, for instance, is among the most common complications observed in cancer patients. It reduces body resistance, especially by causing loss of lean tissue. In addition, it is reported that it negatively affects the healing process by causing side effects during the anti-cancer treatment process. Optimal nutritional therapy in cancer is one of the most frequently researched topics, but it still remains unclear. Today, various nutritional approaches are on the agenda for both cancer prevention and cancer treatment. Some of these approaches are oral nutritional supplement use, ketogenic diet application, probiotic use and functional food applications. The evidence for these prevention and treatment approaches is promising, although controversial. Since cancer is a sensitive process, care should be taken to apply nutritional approaches in a

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way that does not cause side effects in the patient. The aim of this review is to examine current nutritional approaches in the prevention and treatment of cancer in light of the current literature.

Keywords: Cancer, nutrition, diet therapy.

Giriş

Kanser, hücrelerin anormal ve kontrolsüz bölünmesi ile karakterize bir hastalık grubudur[1]. Dünya çapında önde gelen ölüm nedenlerinden biri olan kanserin Dünya Sağlık Örgütü (DSÖ) tarafından 2020'de yaklaşık 10 milyon ölüme veya yaklaşık altı ölümden birine neden olduğu bildirilmiştir. En sık görülen kanserler meme, akciğer, kolon ve rektum ve prostat kanserleridir. Kanserden ölümlerin yaklaşık üçte biri tütün kullanımı, yüksek beden kütle indeksi (BKİ), alkol tüketimi, yetersiz meyve ve sebze alımı ve fiziksel aktivite eksikliğinden kaynaklanmaktadır[2].

Beslenme, kanser insidansında, sonuçlarında ve tedaviden sonra uzun vadeli komorbiditelerin hafifletilmesinde büyük ölçüde önem arz etmektedir. Ancak, onkolojide beslenme önerileri belirsizliğini korumakta ve sıklıkla çelişkili sonuçlar içermektedir[3]. Malnütrisyon, kanser hastalarında yaygın görülen bir problemdir ve hem tümörün varlığının hem de tıbbi ve cerrahi anti-kanser tedavilerinin bir sonucudur. Malnütrisyon, yaşam kalitesini ve tedaviyi olumsuz etkilemekte ve kanser hastalarının %10-20 kadarının tümörün kendisinden ziyade malnütrisyon ve yetersiz besin alımı nedeniyle hayatını kaybettiği tahmin edilmektedir. Bu nedenle, multimodal kanser tedavisinde beslenme önemli bir rol oynamaktadır[4]. Kanser hastalarında yetersiz besin alımının yaygın nedenleri Tablo 1'de sunulmaktadır[5].

Tablo 1. Kanser hastalarında yetersiz besin alımının yaygın nedenleri

• Tümör ve/veya tedavinin bir sonucu olarak tat, koku ve iştahta bozulma
• Değişen yiyecek tercihleri/yiyeceklerden kaçınma/yiyeceklerden tiksinme
• Yeme sorunları (dişler, çiğneme)
• Disfaji, odinofaji veya kısmi/tamamen gastrointestinal obstrüksiyon
• Erken doyma, mide bulantısı ve kusma
• Acı, kserostomi, yapışkan tükürük, ağrılı boğaz, trismus
• Oral lezyonlar ve özofajit
• Radyoterapi/kemoterapi kaynaklı mukozit
• Radyoterapi sırasında ve sonrasında akut veya kronik radyasyon enteriti
• Depresyon, anksiyete
• Ağrı

Bu derlemenin amacı, kanserin önlenmesinde ve tedavisinde güncel beslenme yaklaşımlarını literatür bilgileri ışığında incelemektir.

Oral Nütrisyonel Suplementler

Cerrahi, kemoterapi ve radyasyon tedavisini içeren geleneksel tedavilerin yanı sıra immünoterapi gibi yeni tedavi yaklaşımları, kanser hücrelerini ortadan kaldırmak veya çoğalmalarını engellemek için uygulanmaktadır. Bu tedavilerden sonra kanser

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hastalarının hayatta kalma süreleri uzamasına rağmen, hastaların büyük bir kısmı nüks yaşamakta ve uzun süreli bir sağkalım elde edememektedir[6].

Metabolik farklılaşmalar ile birlikte beslenmede meydana gelen değişiklikler, kanser hastalarının sağkalımını ve iyileşmesini etkileyebilmektedir. Bunlardan bazıları; malnütrisyon, sarkopeni ve kaşeksidir[7,8]. Malnütrisyon, anoreksiya ve vücut ağırlığı kaybını tetikleyen inflamatuar bir durumdan kaynaklanmaktadır. Kanser hastalarında oldukça yaygın olan malnütrisyon sebebiyle, hastaların %15 ila 40'ı tanı anında vücut ağırlığı kaybı bildirmektedir[9]. Bununla birlikte, tüm kanser hastalarının %40 ila 80'inin hastalık seyri sırasında malnütrisyonda olacağı tahmin edilmektedir. Malnütrisyon, tedavi sonuçlarını etkileyebilmekte, yara iyileşmesini geciktirebilmekte, kas fonksiyonunu kötüleştirebilmekte ve postoperatif dönemde komplikasyon riskini artırabilmektedir. Ayrıca anti-neoplastik tedavilere karşı toleransı bozabilmektedir. Bu durum ise daha sonra hastanede kalış süresinin uzamasına, tedavinin kesintiye uğrama riskinin artmasına ve sağkalımın azalmasına neden olabilmektedir[10].

Sarkopeni, hem güç hem de fiziksel fonksiyon üzerinde yaşam kalitesini azaltabilecek bir etki ile yağsız vücut kütlesinde bir azalma ile karakterizedir[11]. Obez hastalarda kansere bağlı vücut ağırlığı kaybı, düşük BKİ ile tanımlanamadığından, obez hastalarda düşük yağsız vücut kütlesi olarak tanımlanan sarkopenik obezite sıklıkla gözden kaçmaktadır[12]. Bu hastalarda vücut kompozisyonundaki değişiklikler metabolik riskte artışa neden olmakta ve tedaviye bağlı yan etkilerin önemli bir belirleyicisi gibi görünmektedir[13,14].

Kanser kaşeksisi, metabolik değişiklikler, sistemik inflamasyon ve iştah azalmasının kombinasyonundan kaynaklanan karmaşık, çok faktörlü bir sendromdur. Geleneksel beslenme desteği ile geri döndürülemez olan, yağ kütlesi kaybı olsun ya da olmasın, istemsiz sürekli vücut ağırlığı kaybı ve iskelet kası kütlesi kaybı ile karakterizedir[15].

Avrupa Klinik Nütrisyon ve Metabolizma Derneği (ESPEN), malnütrisyonlu veya malnütrisyon riski taşıyan kanser hastalarında oral alımı artırmak için beslenme müdahalesi önermektedir. Buna diyet tavsiyesi, besin alımını bozan semptomların ve düzensizliklerin tedavisi ve oral nütrisyonel suplementler (ONS) sunulması dahildir. Malnütrisyonlu veya malnütrisyon riski olan hastalarda enerji alımını kısıtlayan diyet hükümlerinin kullanılmaması önerilmemekle birlikte, bir hastayı beslemeye karar verilmişse, nütrisyonel müdahalelere (beslenme danışmanlığı, ONS) rağmen oral alım yetersiz kalıyorsa enteral nütrisyon (EN), EN yeterli veya uygulanabilir değilse parenteral nütrisyon (PN) önerilmektedir[4]. Kemoterapi görmekte olan pankreas ve safra kanalı kanseri hastalarında ONS'nin yararlı etkilerini araştırmak amacıyla yapılan prospektif randomize kontrollü bir çalışmada, ONS'nin, yağ kütlesini artırarak ve/veya kemoterapi alan pankreatik ve safra kanalı kanseri hastalarının vücut kompozisyonunu koruyarak, özellikle birinci kürde olanlar olmak üzere, beslenme durumunu iyileştirdiği ve yorgunluk semptomlarını hafiflettiği gözlemlenmiştir[16]. Malnütrisyonun bağışıklık sistemini düşürücü etkisi olduğu bilinmektedir. Temiz kontamine baş ve boyun kanseri cerrahisinde tamamlayıcı arginin, glutamin ve balık yağı ile bağışıklık arttırıcı bir diyetin etkisini değerlendirmeyi amaçlayan prospektif randomize kontrollü bir çalışmanın sonuçlarına göre, ameliyat öncesi 7 günlük ve ameliyat sonrası 14 günlük arjinin, glutamin ve balık yağı içeren besin takviyesi diyetinin beslenme durumunu

iyileştirdiğini, ameliyat sonrası hastanede kalış süresinin ve hastane maliyetlerinin azalmasına neden olduğunu göstermiştir[17].

Ketojenik Diyet

Artan sayıda araştırma, kanserin metabolik bir hastalık olduğunu belirtmektedir. Kanser hücreleri, oksijen varlığında dahi (Warburg etkisi ile) enerji için glukozu glikoliz yoluyla metabolize etmektedir. Normal hücreler tarafından kullanılan oksidatif fosforilasyon ile karşılaştırıldığında, aerobik glikoliz, glukoz molü başına üretilen ATP açısından nispeten verimsizdir. Bu noktada, kanser hücreleri çoğalmak için yüksek miktarda glukoza ihtiyaç duymaktadır ve bu da onları glukoz yoksunluğu koşulları altında savunmasız hale getirmektedir[18].

Kanser hücreleri yakıt için glikoza ihtiyaç duysa da, sağlıklı bireylerdeki kan glikoz konsantrasyonları sıkı bir şekilde düzenlenmektedir. Bu durum, kanser hücrelerinin glukoz alımını kolaylaştıran başka faktörlerin olduğunu düşündürmektedir. Bu faktörlerden bir tanesinin insülin olduğu belirtilmektedir. İnsülin, karbonhidrat alımına yanıt olarak salgılanmakta ve hem normal hücreler hem de kanser hücreleri tarafından glukoz alımını indüklemektedir[19]. Kanser hücreleri, normal glukoz konsantrasyonları varlığında bile yeterli glukoz elde etmelerini sağlayan insülin reseptörleri tarafından orantısız bir şekilde doldurulmaktadır[20]. Ek olarak, insülin ve insülin benzeri büyüme faktörü I (IGF-I), mitojenle aktive edilen protein kinaz (MAPK) ve fosfatidalinositol-3 kinazın insülin reseptörü aracılı aktivasyonu yoluyla kanser hücresi çoğalmasını teşvik edebilmektedir[21,22].

Kanser hücrelerinin büyüme ve replikasyon için glukoz ve insüline bağımlılığı göz önüne alındığında, çok düşük karbonhidratlı ve yüksek yağlı (yani ketojenik) bir kanser tedavisinin alternatif yolları araştırılmaya başlanmıştır. Ketojenik diyet (KD) ile vücudun yakıt kaynağı karbonhidrat yerine yağdan sağlanmaktadır, bu da kanser hücreleri için 3 kat dezavantaj sunmaktadır[23,24]. Bunlar:

1) Aerobik glikolize bağımlılıkları nedeniyle, birçok kanser hücresi türü yağı bir enerji kaynağı olarak kullanma kapasitesinden yoksundur.

2) Çoğu kanser hücresi, yağ asidi metabolizmasının bir yan ürünü olarak üretilen keton cisimlerini de metabolize edememektedir.

3) Keton cisimleri kanser hücrelerinin glikolitik metabolizmasını engelleyerek büyümeyi azaltabilmektedir.

Ketojenik diyetler, kanser hastaları için yaygın olarak bilinen ancak tartışmalı bir tedavi yöntemidir[25]. İnsanlarda en yaygın olarak epilepside olmak üzere çeşitli nörolojik hastalıkların yanı sıra tip 2 diyabet gibi metabolik bozukluklar için bir terapi olarak kullanılmıştır[26]. Bu diyetler genellikle düşük yağlı diyetlerden daha uygun bir metabolik profil oluşturur[27]. Özellikle KD'lerin IGF-I ve 24 saatlik plazma glukozunu düşürdüğü ve insülin duyarlılığını arttırdığı gösterilmiştir[28-30]. Karbonhidrat kısıtlaması ayrıca yağsız kütleyi korurken metabolik olarak tehlikeli yağ depolarını seçici olarak azaltır[31].

Yumurtalık veya endometriyal kanserli kadınlarda KD'nin etkinliğini değerlendirmeyi amaçlayan randomize kontrollü bir çalışmada, 12 haftalık KD'nin, toplam ve viseral yağ kaybını desteklediği, yağsız vücut kütlesinin korunmasını ve kansere bağlı büyüme

faktörlerinde azalmalar sağladığı saptanmıştır[32]. KD ve düşük yağlı Amerikan Kanser Derneği diyetinin fiziksel ve zihinsel sağlık durumu, açlık-tokluk ve over veya endometriyal kanserli kadınlarda yeme istekleri üzerindeki etkilerini karşılaştırmak amacıyla yürütülen bir çalışmada, KD'nin yaşam kalitesini olumsuz etkilemediği, fiziksel işlevi iyileştirebileceği, enerjiyi artırabileceği ve yeme isteğini azaltabileceği sonucuna varılmıştır[33]. Kemoterapi alan lokal ileri ve metastatik meme kanserli hastalarda KD'nin etkilerini değerlendirmeyi amaçlayan randomize kontrollü bir çalışmada, KD'nin TNF-α ve insülini azaltarak ve IL-10'u artırarak yararlı etkiler gösterebileceği ve tümör boyutunu küçültebileceği saptanmıştır[34]. KD'nin meme kanserli hastalarda yaşam kalitesi, fiziksel aktivite ve biyobelirteçler üzerindeki etkisini inceleyen başka bir randomize kontrollü çalışmada, 6. haftada kontrol grubuna göre daha yüksek global yaşam kalitesi ve fiziksel aktivite skorları sağladığı gözlemlenmiştir. Ancak, kemoterapi ile kombine edilen KD diyetinin meme kanserli hastalarda, 12. haftada yaşam kalitesi ve fiziksel aktivite açısından ek bir fayda sağlamadığı bildirilmiştir. Bunula birlikte, KD grubunda laktat ve alkalen fosfataz seviyelerinde görülen düşüşler, KD'nin meme kanserli hastalara fayda sağlayabileceği bildirilmiştir[35].

Sonuç olarak, kanser hastalarına KD uygulanması düşünüldüğünde, vücut ağırlığı kaybı ve hasta komorbiditeleri dahil olmak üzere olası yan etkiler dikkatle değerlendirilmelidir. Onkolojide KD'nin etkinliği hakkında nihai bir yargıya varmak için, iyi tasarlanmış bir kontrol grubu ve ayrıca anti-tümör etkilerinin olmadığına dair kanıtları da saptayacak yeterli güce sahip randomize kontrollü bir çalışma sayısının artması gerekmektedir[25].

Probiyotikler

Probiyotikler, yeterli miktarlarda uygulandıklarında konağın sağlık yararlarında merkezi bir rol oynayan, patojenik olmayan canlı mikroplardır[36]. Probiyotiklerin ana özellikleri asit direnci, safra toleransı, mukozal veya epitel hücre adezyonu, anti-mikrobiyal direnç, safra tuzu hidrolaz potansiyeli[37], immünostimülasyon, patojenlere karşı antagonistik, anti-mutajenik ve anti-kanserojenik aktivitelerdir[38].

Probiyotikler ve onların probiyoaktif hücresel materyalleri, gastrointestinal kanalda çeşitli yararlı etkiler oluşturmakta ve farklı enzimler salgılamaktadır. Böylece, sindirim üzerinde potansiyel sinerjistik etkiler oluştururlar. Probiyotikler; laktik asit bakterilerindeki spesifik hücresel bileşenler, hücre aracılı immün yanıt modülasyonu, retikülo-endotelyal sistem aktivasyonu, sitokin yollarının güçlendirilmesi ve interlökinler ve tümör nekroz faktörlerinin düzenlenmesi gibi potansiyel adjuvan etkilere neden olmaktadır[38].

Probiyotikler çoğunlukla bakteriyel veya laktik asit ve laktik asit olmayan bakteri suşları ve mayalar olarak sınıflandırılmaktadır. *Lactobacillus*, *Lactococcus*, *Bifidobacterium* ve *Enterococcus* yaygın bakteriyel probiyotiklerdir. Diğer potansiyel probiyotikler *Clostridiales*, *Bacteroidales*, *Bacillus spp.*, *Escherichia coli*, *Enterococci* ve *Weissella spp.*'dir[39].

Probiyotikler tarafından mutajenin bağlanması, parçalanması ve inhibisyonu; prokarsinojen önleme, zararlı, toksik ve yüksek oranda reaktif kanserojenlerin dönüştürülmesi; sindirilemeyen karbonhidratın bozunması sırasında oluşan kısa zincirli yağ asitleri (SCFA'lar) tarafından bağırsak pH'ının düşürülmesi; konağın doğuştan gelen

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bağışıklık modülasyonu ve anti-inflamatuar moleküllerin salgılanması yoluyla bağışıklığın güçlendirilmesi; probiyotiklerin anti-kanser ve anti-mutajenik aktivitenin ana etki mekanizmalarındandır[40].

Son yıllarda dünya çapında probiyotiklerin insan hastalıklarının önlenmesi ve tedavisinde kullanımına yönelik çalışmalar yapılmaktadır[41]. Probiyotik bileşiklerin (4 suş; *Lactobacillus plantarum*, *L. rhamnosus*, *L. acidophilus* ve *Bifidobacterium animalis subsp.lactis*), klinik ve hayvan modeli doğrulaması yoluyla, gastrik kanserlilerde gastrektomi sonrası potansiyel mekanizmasını belirlemek amacıyla yürütülen bir çalışmada, probiyotik bileşiklerin bağırsak mikrobiyota homeostazını restore edebileceği, inflamasyonu azaltabileceği, bağırsak mukozal bariyerini ve bağışıklığı koruyabileceği, gastrektomi sonrası iyileşmeyi destekleyebileceği ve hastaların prognozunu iyileştirebileceği sonucuna varılmıştır[42]. Probiyotiklerin kemoterapiye bağlı bilişsel bozukluk (CRCI) gelişimi üzerindeki önleyici etkilerini ve altta yatan mekanizmaları belirlemek amacıyla yürütülen bir çalışmada, kemoterapi sırasında probiyotik takviyesinin CRCI insidansını %46 oranında önemli ölçüde azalttığı ve meme kanserli hastaların genel kognitif fonksiyonlarını iyileştirdiği bildirilmiştir[43]. 30 × 10^{10} cfu *Lactobacillus* ve *Bifidobacteria* suşlarının altı canlı mikroorganizmasını altı ay süreyle içeren probiyotik tüketiminin klinik sonuçlar ve inflamatuar sitokinler (TNF-α, IFN-γ, IL-6, IL-10) üzerindeki etkisini belirlemek üzere yapılan bir çalışmada, probiyotiklerin, kolorektal kanser hastalarında ameliyattan dört hafta sonra tüketilmesinin güvenli olduğu ve proinflamatuar sitokinleri (IFN-gama hariç) azalttığı gösterilmiştir[44]. Probiyotik takviyesinin, eş zamanlı radyokemoterapi uygulanan nazofaringeal karsinomlu hastalarda oral mukozitin şiddeti üzerindeki etkisini değerlendirmek üzere yürütülen bir çalışmada, probiyotik takviyesinin (*Bifidobacterium longum*, *Lactobacillus lactis*, ve *Enterococcus faecium*), hastaların bağışıklık yanıtını önemli ölçüde artırdığı ve bağırsak mikrobiyotasının modifikasyonu yoluyla oral mukozitlerin şiddetini azalttığı saptanmıştır[45].

Fonksiyonel Besinler

Fonksiyonel besin kavramı, besinlerin hastalıklara yakalanma riskini azaltmak ve dolayısıyla sağlığı ve yaşam kalitesini iyileştirmek için kullanılması amacıyla 1980'lerde Japonya'da tanıtılmıştır[46]. Fonksiyonel besinler, temel beslenmenin ötesinde sağlık yararları sağlayan besinler ve besin bileşenleridir[47]. Besinlerde doğal olarak bulunan bir dizi bileşik (özellikle bitkilerde veya bunların özlerinde ve uçucu yağlarda bulunan antioksidan bileşikler) potansiyel kemopreventif faktörler olarak umut vaat etmektedir[48,49]. Antioksidanların, birçok kanser türünün ana nedeni olduğuna inanılan deoksiribo nükleik asit (DNA)'daki serbest radikal hasarını azaltabildiği düşünülmektedir. Antioksidan bileşiklerin, hem DNA'daki oksidatif hasarı engelleyerek hem de oksidanla uyarılan hücre bölünmesini azaltarak mutajenezi ve dolayısıyla karsinojenezi azaltabileceğine inanılmaktadır. Normal aerobik metabolizma sırasında süperoksit, hidrojen peroksit ve hidroksil radikali dahil olmak üzere bir dizi reaktif oksijen türü üretilmektedir[50,51]. Bu oksidanlar, DNA, proteinler ve lipitlerin oksidasyonu ile kanser ve ateroskleroz gibi yaşlanma ve dejeneratif hastalıkların oluşumunda rol oynamaktadırlar[52]. Oksidasyon sadece kanser nedeni olmakakla birlikte inflamasyon, karsinojenez için diğer bir faktördür. İnflamasyon, inflamatuar hücreler tarafından

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serbest radikallerin üretilmesi de dahil olmak üzere çeşitli mekanizmalarla kansere neden olmaktadır[53].

Fonksiyonel besinler ile kanseri önlemek ve tedavi sırasında yan etkileri azaltmak arasındaki ilişkiyi gösteren çok sayıda çalışma bulunmaktadır[54]. Modifiye FOLFOX-6 kemoterapisi alan kolorektal kanser hastalarında Kore Kırmızı Ginsengi'nin (KRG) kanser ilişkili yorgunluğu plaseboya kıyasla iyileştirip iyileştirmediğini göstermek amacıyla yürütülen randomize, çift kör, plasebo kontrollü bir çalışmada, KRG alımı, mFOLFOX-6 kemoterapisi alan kolorektal kanserli hastalarda plaseboya göre daha az yorgunluk gelişimi göstermiştir[55]. Domates tüketiminin prostat kanseri riski üzerindeki etkilerini incelemek amacıyla yürütülen bir meta-analiz çalışmasında ise, domates ürünlerinin tüketiminin prostat kanseri riski ile ilişkili olmadığını göstermiştir[56].

Mide kanserini önlemede *Helicobacter pylori* tedavisi, vitamin takviyesi ve sarımsak takviyesinin etkilerini değerlendirmek amacıyla yürütülen randomize plasebo kontrollü bir çalışmada, iki haftalık *Helicobacter pylori* tedavisi ve yedi yıl boyunca vitamin/sarımsak takviyesinin, 22 yıldan uzun süre mide kanserine bağlı ölüm riskini istatistiksel olarak anlamlı bir şekilde azalttığı saptanmıştır[57]. *Nigella sativa L. (N. sativa)* ekstraktının meme kanseri hastalarında akut radyasyon dermatiti (ARD) insidansını önlemedeki etkinliğini değerlendirmeyi amaçlayan randomize kontrollü bir çalışmanın sonuçlarına göre, *N. sativa* ekstresi, meme kanseri hastalarında ARD'nin şiddetini önemli ölçüde azaltmıştır[58].

Sonuç olarak, fonksiyonel besinler, kanserin önlenmesi ve yönetimi de dahil olmak üzere birçok sağlık yararıyla bağlantılı, çeşitli biyolojik aktif bileşiklere sahiptir. Bununla birlikte, insan denekler üzerinde yapılan çalışmalar, herhangi bir diyet bileşeninin kansere karşı koruyabileceğini henüz net bir şekilde göstermemektedir. Ancak, kanser hücrelerinin çoğalmasını ve metastazını önemli ölçüde geciktirebilmektedirler[59].

Sonuç ve Öneriler

Son zamanlarda kanserin önlenmesi ve tedavisi noktasında birçok alternatif beslenme yöntemi kullanılmaya başlanmıştır. ONS kullanımı, ketojenik diyet uygulaması, probiyotik kullanımı ve fonksiyonel besin uygulamaları bu yöntemlerden bazılarıdır. Yapılan çalışmalar doğrultusunda ONS kullanımının kanserde kas kütlesi kaybını önleyebileceği ve kanserle ilişkili yorgunluğu azaltabileceği belirtilmektedir. Özellikle hormonal kanserlerin tedavi yönetiminde ketojenik diyet uygulamaları olumlu sonuçlar verebilmektedir ancak olası yan etkilerinden dolayı dikkatli uygulanmalıdır. Probiyotik kullanımının özellikle oksidatif stresi önlemede faydalı olduğu belirtilmektedir. Fonksiyonel besinlerin kullanım alanı oldukça geniştir ve literatürde kanser hastalığını önleme ve tedavi noktasında çelişkili sonuçlar bulunmaktadır. Yan etkileri sebebiyle mutlaka dikkatli kullanılmalıdır. Bahsi geçen tüm alternatif beslenme tedavisi uygulamaları ile yapılan çalışma sayısının artmasının faydalı olabileceği düşünülmektedir.

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6) For all articles, Turkish and English abstracts

- Should be no more than 400 words and they should be written with at least 3 keywords.
- Only the first letter of the first key word should be capital, the other key words should be written with small letters with comas between them.
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7) ARTICLE TYPES

7.1. Original Research Articles: Original (full-length) Articles are original and proper scientific papers based on sufficient scientific research, observations and experiments. Articles should consist of title, abstract and keywords in Turkish and title, abstract and keywords in English as well as Introduction, Material & Methods, Results, Discussion, Conclusion and References parts. Also it should not exceed 12 pages except in exceptional circumstances (including text, tables and illustrations). There is no limit for the number of references.

The abstract should include the aim, method, results and the conclusion and it should be written accordingly with the example given below.

Example:

Abstract

Aim: The research has been made descriptively in order to determine the levels of the communication skills and the related variables.
Method: The universe of the research consists of 1116 students at the School of Health Sciences of a private university. In the research the universe has not been selected and the universe consists of 615 students that has accepted to join the research. The information form and communication skills scale has been used to collect the data. The data has been evaluated with the SPSS programme.
Results: According to the research findings, the communication skills scale score avarage is 156.1± 13.5. When the relationship between the sociodemographic characteristics and the communication skills scale and the sub dimensions score avarage is analyzed, in women behavioral sub dimension score avarage is higher at students that have taken a theoretical education about communication ($p < 0.05$). The communication skills scale of the students' whose father's education levels are literate is higher ($p < 0.05$)
Conclusion: As a result of the research it has been determined that the communication skills score average is at medium level and it can be suggested that more lessons about communication skills should be given at all departments of the School of Health Sciences.

Keywords: Health, student, communication.

Örnek:

Öz

Amaç: Araştırma, Sağlık Bilimleri Yüksekokulu öğrencilerinin iletişim becerileri düzeylerini ve ilişkili değişkenleri belirlemek amacıyla tanımlayıcı olarak yapılmıştır.

Yöntem: Araştırmanın evrenini, İstanbul'da bulunan bir özel üniversitenin Sağlık Bilimleri Yüksekokulu'nda öğrenim gören 1116 öğrenci oluşturmuştur. Araştırmada örneklem seçimine gidilmeksizin çalışmaya katılmayı kabul eden 615 öğrenci çalışma kapsamına alınmıştır. Verilerin toplanmasında, Bilgi Formu ve İletişim Becerileri Ölçeği kullanılmıştır. Veriler SPSS programı ile değerlendirilmiştir.

Bulgular: Araştırma bulgularına göre; iletişim becerileri ölçeği puan ortalaması 156,1±13,5 bulunmuştur. Öğrencilerin sosyodemografik özellikleri ile iletişim becerileri ölçeği ve alt boyutlarının puan ortalamaları ilişkisi değerlendirildiğinde; kadınlarda, odyoloji bölümünde okuyanlarda ve iletişim ile ilgili teorik eğitim alanlarda davranışsal alt boyutu puan ortalaması daha yüksek bulunmuştur (p<0,05). Baba eğitim düzeyi okuryazar olan öğrencilerin iletişim becerileri ölçeği puan ortalaması daha yüksek bulunmuştur (p<0,05).

Sonuç: Araştırma sonucunda iletişim becerileri puan ortalaması orta düzeyde olduğu saptanmış olup, iletişim becerilerinin daha da geliştirilebilmesi için Sağlık Bilimleri Yüksekokulunun tüm bölümlerinde iletişim becerileri ile ilgili derslere daha fazla yer verilmesinin faydalı olacağı düşünülmektedir.

Anahtar Sözcükler: Sağlık, öğrenci, iletişim.

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** Prof. Dr., Kırıkkale University, Faculty of Arts and Sciences, Department of Biology, Kirikkale, Türkiye. E-mail: .... ORCID https://orcid.org/.........
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ETHICAL STATEMENT: This study was carried out with the approval of the Ethics Committee of .... University, dated .../.../........ and numbered .... A signed subject consent form in accordance with the Declaration of Helsinki was obtained from each participant.

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11.1. BOOKS

11.1.1. One Author	**Author last name Author's first initials.** *Title of Book*. **Edition number. Place of publication: Publisher; year.** Duyan V. *Sosyal Hizmet: Temelleri, Yaklaşımları, Müdahale Yöntemleri*. Ankara: Nar Yayınevi; 2010. Bickley LS. *Bate's Guide to Physical Examination and History Taking*. Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2013.

11.1.2. More than one author **(List all authors if six or less, otherwise list three followed by "et al"or "ve ark")**	**Author(s) last name Author(s)' first initials separated by commas.** *Title of Book*. **Place of publication: Publisher; year.** Tayfur M, Barış O, Nazan Baştaş N. *Diyetisyenlik Eğitimi ve Meslek Etiği*. 2. baskı. Ankara: Hatiboğlu Yayınevi; 2014. Shils M, Shike M, Olson J, Ross AC. *Modern Nutrition in Health and Disease*. 9th ed. Baltimore:Lippincott Williams & Wilkins, 1998.
11.1.3. Edited book	**Author(s) last name Author(s)' first initials, ed(s).** *Title of Book*. **Edition number. Place of publication: Publisher; year.** Norman IJ, ed. *Mental Health Care for Elderly People*. New York: Churchill Livingston; 1996.

	Author(s) last name Author(s)' first initials of article. Title of article. In: Editor's name, ed(s). *Title of Book*. Edition number. Place of publication: Publisher; Year.
11.1.4. Chapter or article from a book	Cohen M. Chronic and Acute. In: Sapphire P, ed. *The Disenfranchised*. Amityville, New York: Baywood Publishing; 2013.
	Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, eds. *Hypertension: Pathophysiology, Diagnosis and Management*. 2nd ed. New York: Raven Press; 1995.

11.2. JOURNALS

Author(s) last name Author(s)'s first initials. Article title. *Journal Title*. Year;volume(issue):Inclusive page numbers.(List all authors if six or less, otherwise list three followed by "et al"or "ve ark")

Sevinç S, Yavaş Çelik M. Akraba evliliklerinin çocuk sağlığına etkisi ve hemşirelik yaklaşımı. *Sağlık ve Toplum*. 2016;2:23-28.

Nabavi SM, Habtemariam S, Daglia M, et al. Neuroprotective effects of ginkgolide B against ischemic stroke: a review of current literature. *Curr Top Med Chem*. 2015;15(21):2222-2232

11.3. ELECTRONIC SOURCES

11.3.1. Electronic articles from online journals with DOI available	**Author(s) last name Author(s)'s first initials. Title of article. Name of Journal. Year;volume(issue):pages. doi:11.1111.** Üstün G, Aluş Tokat M. Gestasyonel diyabet emzirme sonuçları için ne kadar önemli? *Perinatoloji Dergisi*. 2011;19(3):123-129. doi: 10.2399/prn.11.0193005. Rosenbaum M, Leibel RL. Models of energy homeostasis in response to maintenance of reduced body weight. *Obesity*. 2016;24(8):1620-1629. doi: 10.1002/oby.21559.
11.3.2. Electronic articles from online journals without DOI available	**Author(s). Title of article. *Name of Journal*. Year;vol(issue):pages. URL. Published date. Updated date. Accessed date.** Thomas JL. Helpful or harmful? Potential effects of exercise on select inflammatory conditions. *Phys Sportsmed*. 2013;41(4):93-100. https://physsportsmed.org/psm.2013.11.2040. Accessed November 22, 2013.
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11.4. OTHER SOURCES

11.4.1. Thesis	**Author last name Author's first initials. Title of Thesis. [type of thesis]. Name of the place where the thesis was made, Name of the country: Name of the department, Name of the Institute; year.** Undeman C. Fully Automatic Segmentation of MRI Brain Images [master's thesis]. Stockholm, Sweden: NADA, Royal Institute of Technology;2001.
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