GÜSBD 2024; 13(2): 607 - 615 | **Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi** | **Araştırma Makalesi**
GUJHS 2024; 13(2): 607 - 615 | Gümüşhane University Journal of Health Sciences | Original Article

The Relationship Between Pain Quality of Life and Physical Activity Levels in Daily Living Activities in participants with Rotator Cuff Syndrome

Rotator Manşet Sendromlu Katılımcılarda Ağrının Yaşam Kalitesi ve Günlük Yaşam Aktivitelerindeki Fiziksel Aktivite Düzeyleri Arasındaki İlişki

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ABSTRACT

Pain is one of the most important factors affecting the quality of life. The quality of life can be affected in participants with Rotator Cuff Syndrome (RCS) who have pain and restricted shoulder movements. The aim of our study was to examine the effect of the pain on functional status, quality of life and physical activity levels in daily life activities of RCS participants. 40 participants (18-65 ages) with RCS were included in the study. Pain severity (Visual Analogue Scale- VAS), upper extremity functional status and disability (Quick-DASH questionnaire), physical activity level (International Physical Activity Questionnaire- IPAQ) and health related quality of life (Short Form-36- SF-36) were evaluated. Statistical analyzes were conducted using the SPSS 25.0 program.The participants mean age was 50.40 ± 11.37 and of 26 were female and of 14 were male. In the study, significant relationship was found between the Quick-DASH score and shoulder pain at night (r:0,323, p:0,042), at rest (r:0,454, p:0,043), during activity (r:0,318, p:0,046) and during heavy object carrying (r:0,321, p:0,043). It was observed that there was a significant negative correlation between SF-36 subtest scores and night shoulder pain PF (r: -0.316, p: 0.047), PR (r: -0.550, p: 0.004), BP (r:0,323, p:0,044), GHS (r-:0,610, p:0,00), VT (r:-0,449, p:0,004) SF (r:-0,497, p:0,001). RE (r:-0,317, p:0,046). IPAQ results show that shoulder pain is worse at night (r: -0.244, p: 0.282), at rest (r: -0.084, p: 0.148), during activity (r: 0.155, p: 0.265) and when carrying heavy objects (r: -0.035, p:0.297) no significant relationship was found. The shoulder pain caused a decrease in functional status and quality of life and had no effect on the level of physical activity.

Keywords: Rotator Cuff Syndrome, Quality of Life, Pain, Physical Activity

ÖZ

Ağrı yaşam kalitesini etkileyen en önemli faktörlerden biridir. Ağrısı ve omuz hareketlerinde kısıtlılık olan Rotator Manşet Sendromu (RMS) hastalarında yaşam kalitesi etkilenebilmektedir. Çalışmamızın amacı RMS hastalarının günlük yaşam aktivitelerinde ağrının fonksiyonel durum, yaşam kalitesi ve fiziksel aktivite düzeylerine etkisini incelemektir. Çalışmaya RMS'li 40 hasta (18-65 yaş) dahil edildi. Ağrı şiddeti (Görsel Analog Skala-VAS), üst ekstremite fonksiyonel durumu ve sakatlığı (Quick-DASH anketi), fiziksel aktivite düzeyi (Uluslararası Fiziksel Aktivite Anketi-IPAQ) ve sağlıkla ilişkili yaşam kalitesi (Kısa Form-36-SF-36) değerlendirildi. İstatistiksel analizler SPSS 25.0 programı kullanılarak yapıldı. Olguların yaş ortalaması 50.40 ± 11.37 olup, 26'sı kadın, 14'ü erkekti. Araştırmada Quick-DASH skoru ile gece (r:0,323, p:0,042), istirahat (r:0,454, p:0,043), aktivite (r:0,318, p:0,046) ve ağır nesne taşıma (r:0,321, p:0,043) sırasındaki omuz ağrısı arasında anlamlı ilişki bulunmuştur. SF-36 alt testi puanları ile gece, omuz ağrısı PF (r:-0,316, p:0,047), PR (r:-0,550, p:0,004), BP (r:0,323, p:0,044), GHS (r-:0,610, p:0,00), VT (r:-0,449, p:0,004) SF (r:-0,497, p:0,001). RE (r:-0,317, p:0,046) arasında anlamlı negatif korelasyon olduğu görüldü. IPAQ sonuçları ile omuz ağrısının gece (r:-0,244, p:0,282), istirahat (r:-0,084, p:0,148), aktivite (r:0,155, p:0,265) ve ağır nesne taşıma (r:-0,035, p:0,297) arasında olarak anlamlı bir ilişki bulunamadı. Omuz ağrısının fonksiyonel durum ve yaşam kalitesinde azalmaya neden olduğu ve fiziksel aktivite düzeyini etkilemediği görüldü.

Anahtar Kelimeler: Rotator Manşet Sendromu, Yaşam Kalitesi, Ağrı, Fiziksel Aktivite

Ethical approval for the study was obtained from the Istanbul Medipol University Ethics Committee for Noninterventional Research (Date: 24/03/2016/ Number: E-10840098-604.01.01). 2nd Internatıonal Congress Of Multıdıscıplınary Studıes In Medıcal Scıences February 13-14, 2021/Ankara, Turkey

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Geliş Tarihi / Received: 28.12.2023
Kabul Tarihi/Accepted: 25.06.2024

INTRODUCTION

Shoulder pain is most commonly caused by rotator cuff syndrome (RCS).[1] RC muscles and extrinsic shoulder muscles, which are placed in a special rotation, have a balance within themselves. This balance between muscles is disrupted due to tears. [2] Chronic repetitive post-traumatic tear or acute post-traumatic tear are two generally accepted theories in the mechanism of rotator cuff tears in the shoulder.[3] Shoulder pain ranks third in terms of frequency among musculoskeletal system pains. It occurs in 7% to 26% of the adult population. The incidence of RCS increases with age. The prevalence rates of RCS increase from 5% to 10% in participants younger than 20 years old, and more than 60% in participants older more than 80 years old.[4,5] The incidence of rotator cuff tears increases with increasing repetitive shoulder movements and aging.

In RCS, pain, edema, inflammation and limitation of movement occur over time in the shoulder. As a result of these symptoms, upper extremity functions are affected and daily life activities of the person are restricted. Physical therapy agents and exercises are used conservatively in the treatment of RCS. Surgical methods are used in participants who do not specifically respond to treatment. The aim of RCS treatment is to provide normal anatomy of the affected shoulder, to reduce pain, to increase muscle strength and range of motion.[6] Early diagnosis is important in preventing the increasing limitation of movement due to shoulder pain and the resulting decrease in quality of life in participants with RCS.[7] It has been stated that the quality of life is affected when individuals encounter changes that affect their well-being.[8] Therefore RCS lesions affect the physical, biomechanical, psychological and social activities of individuals. There is increasing interest in studies analyzing concrete aspects of quality of life, such as RCS lesions that can cause disability and pain, among others, in shoulder joint disorders.[9] It was stated that individuals with shoulder disability have lower physical, mental and general health scores among the sub-dimensions of quality of life.[10,30] In another study, it was reported that participants with RCS had lower quality of life before treatment, and higher quality of life scores after treatment due to pain reduction.[11]

The aim of our study was to examine the effect of the pain on functional status, quality of life and physical activity levels in daily life activities of RCS participants. Our hypothesis was that there is a relation between pain on functional status, quality of life, and physical activity levels in daily life activities of participants with RCS.

MATERIALS AND METHODS

Study Design

The study was carried out in our university hospital physical therapy and rehabilitation clinic. Each participant voluntarily provided written informed consent before participating. Participants who were admitted to the clinic with shoulder pain and diagnosed with RCS were included in the study.

The study protocol was explained to the participants and Informed Consent Forms were obtained before the study. The criteria for enrollment included the participants with RCS, aged between 18-65 years, not to undergo a surgical operation, and agreeing to participate in the study. Exclusion criteria were defined as mental disability at the level of understanding the tests and preventing interviews, chronic disease, being pregnant, receiving medical treatment (steroid therapy, non-steroid anti-inflammatory drugs, insulin etc.) in the last 6 months.

The age, sex, occupation, education, height, weight, marital status, dominant and affected side were recorded on socio-demographic form. Pain intensity (Visual Analogue Scale- VAS) [12,13], upper extremity functional status and disability (The Shortened Disabilities of the Arm, Shoulder and Hand Score – Quick-DASH)[14,15], physical

activity level (International Physical Activity Questionnaire- IPAQ) [18,19] and quality of life (Short Form-36)[16,17] were evaluated. Participants were evaluated by the same physiotherapist (MST) with 6 years of experience.

Outcome Measurements

Visual Analog Scale

The Visual Analogue Scale is a common type of response variable in health outcome research, and is typically described as a single line of 100 mm with keywords at either end (e.g. no pain – worst possible pain). Pain intensity was evaluated with VAS in the study. The severity of pain was questioned separately for each situation as night, resting, during activity and heavy object handling pain. It is written "I have no pain" at one end and "I have very severe pain" at the other side on the line. Then the participant marks the current pain condition on this line. The length of the distance from the place where there is no pain to the point marked by the participant indicates the severity of the participant's pain.[12,13]

The Shortened Disabilities of the Arm, Shoulder and Hand Score (Quick- DASH

The Quick-DASH questionnaire was used to determine the participant's condition regarding upper extremity activity and participation.[15] The Turkish reliability and validity study of the questionnaire was carried out by Düger et al.[14] This questionnaire measures the limitations of activity and participation in all disorders at the upper extremity and enables the participant to evaluate himself. The difficulties experienced by the participants during their daily activities are questioned with 11 questions in the questionnaire. Each answer is scored from 1 to 5 with the Likert scale as 1 (no difficulty), 2 (mild difficulty), 3 (moderate difficulty), 4 (extreme difficulty), 5 (not being able to do it). The score between 0-100 (0: no disability, 100: maximum disability) is obtained from each part of the Quick-DASH questionnaire. The questionnaire was completed in an average of 5-7 minutes.[15]

Short Form-36 (SF-36)

The SF-36 is one of the quality of life scales widely used in the healthcare field and is not specific to any age, disease, or treatment modality.[16] Koçyiğit et al. were carried out the Turkish validity and reliability study of the SF-36.[17] It consists of 8 sub-scales and 36 items about physical and mental health assessments. The sub-scales of the physical health assessment include physical function (PF), physical role (PR), body pain (BP), and general health status (GHS). The sub-scales related to mental health status include vitality (VT), social function (SF), role of emotion (RE), and mental health (MH).[17] The total score between 0-100 was calculated according to the answers by the participants. The higher the total score is shown the higher quality of life.[16]

International Physical Activity Questionnaire (IPAQ)

The IPAQ is used as a standardized measure to estimate the daily practice of physical activities of populations from different countries and socio-cultural contexts.[18] The Turkish validity and reliability of the scale were made by Saglam et.al.[19] The IPAQ measures the frequency and duration of moderate physical activity, vigorous physical activity, walking, and sedentary behavior of adults (aged 18-65 years old) using 7 questions. In addition, a seventh question records the time that subjects spend sitting during an average weekday.[20] This questionnaire includes questions about physical activity for a minimum of 10 minutes in the last 7 days. The IPAQ criteria by which physical activities are classified as vigorous or moderate-intensity were underlined. The physical activity score for each vigorous, moderate and walking physical activity was calculated and expressed in MET (Metabolic Equivalent Task)-minutes per week.[18] According to the IPAQ MET-scoring method, the MET intensities used to score IPAQ were vigorous (8METs), moderate (4METs) and walking (3.3 METs) According to the results obtained, the level of physical activity was divided into 3 categories as inactive, minimum active, and very active.[21]

Ethical Considerations

Ethical approval for the study was obtained from the Istanbul Medipol University Ethics Committee for Noninterventional Research (Protocol No: E-10840098-604.01.01-4606).

Statistical Analysis

SPSS (Statistical Package for the Social Sciences) 25.0 statistical program was used for the statistical analysis. The evaluation of the data was made at 95% confidence interval and $p \leq 0.05$ significance level. Accordingly, the Shapiro-Wilk test was used to evaluate whether the data showed normal distribution. Average and percentage rates were determined in the data related to the identification of the participants. Pearson correlation analysis was used to determine the relationship between the scales. The t test were used for the statistical analysis of the Quality life (SF-36) sub-dimension score, Quick-DASH score and pain levels according to the physical activity levels**.**

RESULTS AND DISCUSSION

Demographic informations of the participants were given on Table 1. When the education distribution of the participants was examined, it was seen that 2.5% were lawyers, 7.5% were retired, 2.5% were tradesmen, 55% are housewives, 2.5% are civil servants, 2.5% architects, 7.5% engineers, 2.5% students, 2.5% marketers, 2.5% designers and 10% self-employed.

Table 1. Demographic Information of the Participants

		n	%
Sex	Women	26	65
	Men	14	35
Dominant side	Right	36	90
	Left	4	10
Affected side	Right	22	55
	Left	18	45
		Mean ± SD	
Age (years)		50.40±11.37	
Mass (kg)		77.57±12.02	
Height (cm)		166.50±7.59	
Body mass index (kg/m²)		27.92±3.78	

Kg: Kilogram; Cm: Centimeter; M: Meters, SD: Standard Deviation.

The minimum active participants was found 24 (mean MET = 2062.54 ± 582.9 min/week) and the number of very active participants was found 16 (mean MET = 4638.81 ± 1578.6 min/week) (Table 2).

In the pain assessment of the participants, it was found that the highest was carrying heavy objects pain severity (7.50 ± 2.12) and the lowest was resting pain severity (2.50 ± 1.94) (Table 2).

Table 2. Quick-DASH Score, SF-36, VAS and IPAQ Results

		Mean±SD
Quick-DASH Score		86.36 ±22.078
SF-36	Physical function	56.12 ±19.46
	Physical role	28,12±28.41
	Body pain	39.20 ±23.86
	General health status	53.07±17,08
	Vitality	50.12±17.37
	Social function	55.07±22.99
	Emotional role	44.80±38.14
	Mental health	62.40±18.17
VAS	At Night	5.17±2.07
	At Rest	2.50±1.94
	During activity	5.75±1.73
	During carrying heavy objects	7.50±2.12
IPAQ	Vigorous physical activity	253±461.20
	Moderate physical activity	423.50±436.11
	Walking	1055.50±1600.97
	Sitting	1489.50±935.02
	Total physical activity	3093.50±1671.14
		n (%)
IPAQ Levels	Inactive	0 (%0)
	Minimum active	24 (%60)
	Very active	16 (%40)

Quick-DASH: Upper Extremity Functional Status and Disability; IPAQ: International Physical Activity Questionnaire Short Form; VAS: Visual Analogue Scale; SF-36: Short Form-36; PA: Physical Activity; SD: Standard Deviation.

No statistically significant difference was found between the Quick-DASH scores according to the activity levels of the participants (p=0.877). The quality of life sub-dimension scores did not differ according to the activity levels of the participants (p>0.05). Pain scores do not differ statistically according to the activity levels of the participants (p>0.05) (Table 3).

Table 3. Quality Life (SF-36) Sub-Dimension, Quick-DASH and Pain Levels According to the Physical Activity Levels of the Participants

		n	Mean±SD	p
PF	Minimum active	24	56.87±20.84	0.770
	Very active	16	55±17.79	
PR	Minimum active	24	42.30±23.68	0.551
	Very active	16	47.91±22.50	
BP	Minimum active	24	36.12±24.96	0.325
	Very active	16	43.81±22.08	
GHS	Minimum active	24	52.5±17.38	0.798
	Very active	16	53.93±17.14	
VT	Minimum active	24	47.70±17.38	0.287
	Very active	16	53.75±17.27	
SF	Minimum active	24	49.20±24.03	0.057
	Very active	16	63.87±18.76	
RE	Minimum active	24	44.29±41.31	0.919
	Very active	16	45.56±34.13	
MH	Minimum active	24	66±16.72	0.127
	Very active	16	57±19.45	
Quick-DASH	Minimum active	24	49.20±22.42	0.877
	Very active	16	48.14±18.46	
Night	Minimum active	24	5.54±1.91	0.174
	Very active	16	4.62±2.24	
Rest	Minimum active	24	2.37±1.83	0.625
	Very active	16	2.68±2.15	
Activite	Minimum active	24	5.54±1.84	0.359
	Very active	16	6.06±1.56	
Lifting	Minimum active	24	7.62±2.26	0.654
	Very active	16	7.31±1.95	

PF: Physical Function; PR: Physical Role; BP: Body Pain; GHS: General Health Status; VT: Vitality, SF: Social Function; RE: Emotional Role, MH: Mental Health; Quick-DASH: Upper Extremity Functional Status and Disability.

In the study, significant relationship was found between the Quick-DASH score and shoulder pain at night (r:0,323, p:0,042), at rest (r:0,454, p:0,043), during activity (r:0,318, p:0,046) and during heavy object carrying (r:0,321, p:0,043). It was observed that there was a significant negative correlation between SF-36 subtest scores and night shoulder pain PF (r: -0.316, p: 0.047), PR (r: -0.550, p: 0.004), BP (r:0,323, p:0,044), GHS (r-:0,610, p:0,00), VT (r:-0,449, p:0,004) SF (r:-0,497, p:0,001), RE (r:-0,317, p:0,046). IPAQ results show that shoulder pain is worse at night (r: -0.244, p: 0.282), at rest (r: -0.084, p: 0.148), during activity (r: 0.155, p: 0.265) and when carrying heavy objects (r: -0.035, p:0.297) no significant relationship was found. (Table 4).

Rotator cuff tears are the most common cause of pain and muscle weakness in the shoulder. It occurs after acute trauma, as a new symptomatic extension of a chronic degenerative or existing asymptomatic tear. In this study, it was found that the pain affects negatively the quality of life and did not affect physical activity.

With aging, the blood supply level of the RC tendons also decreases. However with the decrease in blood flow, the natural repair mechanisms of the body come into play; however, it fails to repair the injury.[22] Milgrom et al. have shown the high incidence of RCS in individuals with high mean age.[23] At this point, the age group of the participants in our study was evaluated and the average was found to be 50.40 ± 11.37. Considering the average age, it shows that the age increases the probability of RC injury is high in the study. Fuchs et al associated RCS seen in housewives with the excess of movements involving repetitive wrist extension in daily living activities. As a result of this study, it was observed that the number of women is more dominant than the number of men in participants with RCS.[24] The reason for this was thought to be that women get the disease more frequently as a result of repetitive traumas and their muscular inadequacy during complex movements, which predispose to RCS in women, due to the inadequate muscular structure of women compared to men. When we examined the occupational distribution of our participants, 55% were housewives. Similarly, in our study, the number of females in participants diagnosed with RCS was found to be higher than in males.

Kostanoğlu et al. stated that the body's response to pain protects the area in the acute period and restricts physical activities in the chronic period. However, they reported that pain affects the quality of life level by physically restricting individuals, psychologically challenging them, and impairing sleep quality.[25] In our study, it was found that the pain severity was highest during carrying a heavy object and during daily activities. According to our findings, as pain intensity increased, upper extremity functional status and disability also increased. In addition, the increase in night pain, rest pain, activity pain and heavy object carrying pain negatively affected the activity participation level of the shoulder area. In RCS, we can perceive the restricted upper extremity activity-participation level due to

pain and decreased daily life activities as the body's response to pain.

Severe pain comes first among the findings of RCS. In order for the shoulder to function painlessly and properly, the shoulder depressors must work on time by preventing compression, capsular laxity and sufficient subacromial space. If one of the listed components is damaged, RCS begins in the shoulder and pain occurs.[26] In our study, it was found that the participants had the highest lifting pain. In addition, it has been stated in the literature that pain significantly affects the quality of life. The psychological conditions of the people are also negatively affected by the restriction of shoulder movements and the difficulty of daily life activities. Recent studies have shown that shoulder pain may not only affect functionality in work and leisure activities, but also prevent psychological and social well-being.[27] It is also associated with the formation of depression and anxiety. In our study, the quality of life sub-dimensions of the participants were found to be lower than the Turkish population. In addition, as a result of the analysis, a negative relationship was found between quality of life and pain. Increased pain level in participants associated with a decrease in quality of life sub-dimension scores.

Demiral et al. determined the average values of SF-36 in Turkish society in their study.[28] When we compared the SF-36 average values with the average values of Turkish society, we found that the quality of life levels of our participants was quite low. In the relationship between pain intensity and quality of life, we have seen that night pain affects the parts of physical function, physical role difficulty, general health perception, energy vitality, social functionality, and emotional role difficulty. Resting pain was found to be significantly associated with physical function, general health perception, energy-vitality-vitality social functionality, and mental score parts of SF-36. Gazielly et al. stated in their study that resting and activity pain in RCS restricts activities of daily living and affects the level of quality of life. It was observed that physical function, energy-vitality-vitality and social functionality parts of SF-36 were affected by the pain our participants felt while carrying heavy objects.[29]

Demiral et al. emphasized in their study that shoulder severity in RCS is associated with many bio-psycho-social factors. The combination of self-reported bio-psycho-social factors, including PROMs, explained the degree of shoulder severity.[30] It was observed that the physical function, energy-vitality- and social functionality sections of the SF-36 were affected by the pain our participants felt while carrying heavy objects. We think that night pain and SF-36 negatively affect social functionality and mental health.

We think that the level of functionality restricted due to pain, negatively affects activity-participation, impairs mental health and therefore decreases in social functionality. When the relationship between pain intensity and IPAQ scores was checked, it was determined that night pain, resting pain, activity pain and heavy object carrying pain were not effective on IPAQ. Chronic musculoskeletal pain negatively affects people's quality of life. Especially in long-lasting chronic pain, emotional structure, social function and general health perception may change. Tarsuslu et al. found that participants with chronic physical disabilities had higher levels of pain, depression and anxiety, and lower quality of life, compared to healthy people. The limitation that the right shoulder or the left shoulder will create in individuals without being the dominant side creates negativity in their participation in life by affecting the daily life activities of the individual. These negativities are not only related to physical conditions, but also affect the mental, mental and psychological state of the person and cause a decrease in the quality of life.[31]

Desmeules et al. found in a systematic review that there was moderate evidence that supervised exercise was an effective method of treating participants with RCS and enabling them to return to work.[32] The RCS participants in our study were told that challenging exercises you do alone will

increase your pain, so exercising under the supervision of a physiotherapist will be beneficial for faster recovery.

Table 4. Correlation Between Pain and Quick-DASH Score, IPAQ, SF-36

Pain		Quick-DASH score	IPAQ	SF-36							
				PF	PR	BP	GHS	VT	SF	RE	MH
Night	r	0,323*	-0,244	-0,316*	-0,550**	-0,321*	-0,610**	-0,449**	-0,497**	-0,317*	-0.188
	p	**0.042**	0,282	**0.047**	**0.004**	**0.044**	**0.000**	**0.004**	**0.001**	**0.046**	0.245
Rest	r	0,454*	-0,084	-0,326*	-0.222	-0.293	-0,436**	-0,377*	-0,334*	-0.173	-0371*
	p	**0.043**	0,148	**0.040**	0.286	0.066	**0.005**	**0.017**	**0.035**	0.286	**0.019**
Activity	r	0,318*	0,155	-0.196	-0.217	-0.199	-0.155	-0,390*	-0.153	-0.097	-0.218
	p	**0.046**	0,265	0.225	0.297	0.218	0.340	**0.013**	0.346	0.552	0.177
Lifting	r	0,321*	-0,035	-0,451**	-0.175	-0,341*	-0.258	-0,533**	-0,352*	-0.232	-0.141
	p	**0.043**	0,297	**0.003**	0.404	**0.031**	0.108	**0.000**	**0.026**	0.149	0.386

**P≤0.05 or **P=0.000 There is Statistical Difference; Quick-DASH: Upper Extremity Functional Status and Disability; IPAQ: International Physical Activity Questionnaire Short Form; SF-36: Short Form-36; PF: Physical Function; PR: Physical Role; BP: Body Pain, GHS: General Health Status; VT: Vitality, SF: Social Function; RE: Emotional Role; MH: Mental Health; SD: Standard Deviation.*

CONCLUSION AND RECOMMENDATIONS

RCS causes problems such as weakness and loss of movement in the shoulder muscles, especially pain, and decreases the quality of life as a natural result of these. It was observed that shoulder pain caused a decrease in functional status and quality of life and had no relation on the level of physical activity. We are of the opinion that participants with RCS should be followed up with exercises under the supervision of a physiotherapist in order to prevent their complaints.

In future studies, case-control and cohort studies with SF-36, IPAQ and Quick-DASH forms in individuals experiencing RCS; We think that it should be done in participant groups with close age range, considering the concept of sex, and the sub-features of the scales should be examined in more detail.

Acknowledgements

I would like to thank Asst. Prof. Burcu DİLEK, who helped and supported my work.

Conflict of interest

The authors have no conflict of interest to report.

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