Kocatepe Tıp Dergisi
Kocatepe Medical Journal
26:255-261/ Temmuz 2025 Sayısı

ARAŞTIRMA YAZISI / RESEARCH ARTICLE

ÇOCUKLARDA KULAK-BURUN- BOĞAZ POLİKLİNİK ZİYARETLERİNDEKİ ARTIŞIN BİR BELİRTİSİ OLARAK KÖTÜ BESLENME KALİTESİ

POOR DIET QUALITY AS A PREDICTOR OF INCREASED EAR-NOSE-THROAT OUTPATIENT VISITS IN CHILDREN

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ÖZET

AMAÇ: Bu çalışmanın amacı Kulak Burun Boğaz (KBB) polikliniğine başvuran çocukların beslenme alışkanlıklarını değerlendirmek ve Akdeniz diyetine uyumun KBB ziyaretleriyle ilişkili olup olmadığını araştırmaktır.

GEREÇ VE YÖNTEM: Çalışmaya 4 ile 16 yaşları arasında toplam 539 çocuk dahil edilmiştir. Katılımcılardan yaş, cinsiyet ve ek kronik hastalık varlığına ilişkin veriler toplanmıştır. Katılımcılar, temel şikayetlerine göre gruplara ayrılmış ve beslenme alışkanlıkları, Çocuklar ve Ergenler için Akdeniz Diyet Kalite İndeksi (KIDMED) anketi Türkçe versiyonu ile değerlendirilmiştir. KIDMED skorlarının gruplar arasındaki istatistiksel karşılaştırmaları Welch t-testi ve ki-kare testi kullanılarak yapılmış ve anlamlılık düzeyi $p<0,05$ olarak kabul edilmiştir.

BULGULAR: Genel ortalama KIDMED skoru 5,48 ± 2,18 olarak bulunmuştur. Tekrarlayan üst solunum yolu enfeksiyonu (5,01 ± 2,31), obstrüktif semptomlar (5,74 ± 2,34) ve alerjik rinit (4,93 ± 1,80) olan çocukların skorları, kontrol grubuna (6,42 ± 1,39) kıyasla anlamlı derecede daha düşük bulunmuştur. Bu gruplarda ayrıca fast food ve işlenmiş gıda tüketimi daha sık olup, balık ve meyve alımı daha düşük düzeyde bulunmuştur. Ayrıca, 10 yaşından büyük çocuklar ve alerjik hastalıkları olanlar, Akdeniz diyetine daha düşük uyum göstermiştir.

SONUÇ: Bulgular, düşük Akdeniz diyeti uyumu ile değerlendirilen zayıf beslenme kalitesinin, çocuklarda özellikle tekrarlayan enfeksiyonları ve alerjik hastalıkları olanlarda artmış KBB morbiditesi ile ilişkili olduğunu göstermektedir. Bu sonuçlar, fast food tüketiminin azaltılması ve besleyici gıdaların teşvik edilmesine yönelik beslenme müdahalelerinin, pediatrik KBB yönetim stratejilerine dahil edilmesinin potansiyel faydalarını vurgulamaktadır.

ANAHTAR KELİMELER: Diyet, Akdeniz, Rinit, Alerjik, Tekrarlayan Üst Solunum Yolu Enfeksiyonu.

ABSTRACT

OBJECTIVE: This study evaluates the dietary patterns of children presenting to the Ear Nose Throat (ENT) polyclinic and to investigate whether non-adherence to the Mediterranean diet is associated with an increased number of ENT visits.

MATERIAL AND METHODS: A total of 539 children aged between 4 and 16 years were included in the study. Data on age, gender, and the presence of any additional chronic diseases were collected. Participants were categorized into groups based on their primary complaints, and their dietary habits were assessed using the Turkish version of the Mediterranean Diet Quality Index for Children and Adolescents (KIDMED) questionnaire. Statistical comparisons of KIDMED scores between groups were performed using Welch t-tests and chi-square tests, with the significance level set at $p<0.05$.

RESULTS: The overall mean KIDMED score was 5.48 ± 2.18. Children with recurrent upper respiratory tract infections (5.01 ± 2.31), obstructive symptoms (5.74 ± 2.34), and allergic rhinitis (4.93 ± 1.80) had significantly lower scores than the control group (6.42 ± 1.39). These groups also exhibited a higher frequency of fast food and processed food consumption, coupled with lower intakes of fish and fruit. Additionally, children with allergic conditions and those older than 10 years demonstrated poorer adherence to the Mediterranean diet.

CONCLUSIONS: The findings suggest that poor diet quality, as evaluated by low adherence to a Mediterranean diet, is associated with increased ENT morbidity in children—especially among those with recurrent infections and allergic conditions. These results highlight the potential benefit of incorporating dietary interventions aimed at reducing fast food consumption and promoting nutrient-dense foods into pediatric ENT management strategies.

KEYWORDS: Diet, Mediterranean, Rhinitis, Allergic, Respiratory Tract Infections.

Geliş Tarihi / Received: 10.03.2025
Kabul Tarihi / Accepted: 27.05.2025
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INTRODUCTION

Children constitute a significant proportion of patients in otolaryngological clinics and we treat many diseases whose pathogenesis has not been clearly established, with frequently updated guidelines. We prescribe many medications, including antibiotics. Among the majority of pediatric ENT patients, the increasing frequency of diseases such as recurrent upper respiratory tract infections and allergic rhinitis has increased the interest in identifying modifiable risk factors. For this, dietary habits have attracted attention, as accumulating evidence suggests that nutrition plays a crucial role in immune function, inflammation, and overall respiratory health. Childhood dietary patterns influence not only health outcomes but also long-term immune resilience and susceptibility to recurrent infections (1-5). This raises the question about the role of diet of pediatric patients in ENT.

The Mediterranean diet (MD) has been extensively studied for its anti-inflammatory and immune-modulating properties, with multiple studies linking adherence to the MD with a reduced risk of chronic diseases (6, 7). MD is characterized by a high consumption of foods such as fruits, vegetables, whole grains, olive oil, nuts, and fish, which are thought to increase levels of antioxidants and polyphenol, supporting immune function and reducing systemic inflammation (8). On the other hand, it is known that poor quality diets are characterized by consumption of high amounts of processed foods and refined sugars, which may contribute to chronic inflammation and thus increase susceptibility to infections (9). Adherence to MD may exert protective effects and reduce the severity and recurrence of disorders that may be associated with such impairments in immunomodulation (8, 10, 11).

The aim of this study is to evaluate the dietary patterns of children with otolaryngological complaints and to determine a possible relationship between the reasons for admission. Additionally, we explored the influence of allergic status on dietary patterns and evaluated whether diet quality varied across different pediatric age groups. Previous studies have suggested potential benefits of the MD in pediatric otolaryngologic conditions such as otitis media with effusion (12). To the best of our knowledge, no study has yet examined the specific relationship between adherence to MD and nature of ENT consultations in a broader pediatric population by analyzing these associations. Thus, our study seeks to provide insights into the potential role of diet as a preventive or modifying factor in pediatric otolaryngologic diseases. Therefore, this study aims to elucidate the potential role of diet as a preventive or modifying factor in pediatric otolaryngologic diseases.

MATERIALS AND METHODS

A cross-sectional study was conducted on a cohort of children aged between 4 and 16 years who applied to the ENT outpatient clinic. Dietary habits were assessed using the Turkish version of the Mediterranean Diet Quality Index for Children and Adolescents (KIDMED) (13) questionnaire, which evaluates adherence to MD. The KIDMED score is based on a questionnaire with a total of 16 questions. Among these, 12 questions reflect positive eating habits (each yielding +1 point when answered affirmative), while 4 questions represent negative eating habits (scoring affirmative answers with -1 point). This scoring system allows for a total score that ranges from –4 to 12. Scores between 8 and 12 reflect high adherence, showing that most of the recommended healthy eating practices are followed. In contrast, scores in the range of 4 to 7 indicate moderate adherence, meaning that while some beneficial dietary habits are in place, there is still room for improvement. Scores between 0 and 3 signal low adherence, suggesting that the child's diet significantly deviates from the MD model. The allergic status of children and additional chronic diseases was also recorded. The questionnaires were filled out together with the patients and their parents.

A total of 539 patients completed the questionnaire. Patients were divided into 4 groups in terms of their complaints as recurrent upper respiratory tract infections (group 1), obstructive symptoms (group 2), allergic rhinitis symptoms (group 3), and ungroupable-other (group 4). Diagnoses such as recurrent otitis media, chronic suppurative otitis media, recurrent adenoiditis, sinusitis were included in

group 1, patients with symptoms related to adenotonsillar hypertrophy were included in group 2, and patients related to allergic rhinitis were classified as group 3. Patients included in group 4 were those who could not be included in the other 3 groups (such as auditory problems, chronic lymphadenopathies). The control group consisted of patients who applied to the outpatient clinic for traumatic reasons such as nasal fractures and skin lacerations and who had not applied to the ENT outpatient clinic in the last year. Patients were divided into those with and without allergic conditions and compared separately. Additionally, patients were divided into two groups as older than 10 years and younger than 10 years and compared.

Descriptive statistics were computed for KIDMED scores, age, and allergic status. Welch's t-tests were used to compare mean KIDMED scores between four group and control group, between allergic and non-allergic children and as well as between different age groups. We performed chi-square tests to assess differences in responses to the 16 KIDMED dietary questions between each study group and the control group. A contingency table was created for each group and each question, followed by Pearson's chi-square test to determine statistically significant differences.

Ethical Committee

The study was conducted from January to June 2024 at the Giresun Training and Research Hospital and was approved by the Committee of Ethics (KAEK-171) of the Giresun Training and Research Hospital.

Statistical Analysis

The statistical analysis was carried out using R 4.4.2 (R Core Team, 2023) and the rrcov package (v1.7-5, Todorov, & Filzmoser 2009). All p-values under 0.05 were regarded as statistically significant.

RESULTS

The mean KIDMED score for the entire sample was 5.48 ± 2.18. Group-specific mean scores were as follows: Group 1 achieved a mean score of 5.01± 2.31, Group 2 achieved a mean score of 4.93±1.80, Group 4 achieved a mean score of 6.06±1.88, and the control group achieved a mean score of 6.42±1.39. Children in Groups 1 ($p<0.001$) , 2 ($p=0.028$) and 3 ($p<0.001$) had significantly lower KIDMED scores compared to the control group indicating poorer adherence to the Mediterranean diet **(Table 1 and Figure 1).**

Table 1: Age, gender and KIDMED scores

	Age (sd)	Male Count	Female Count	Total Count	KIDMED (sd)	Precentage of low scores (≤3)
1	9.41 (3.71)	96	83	179	5.01 (2.31)	25
2	8.13 (3.16)	84	62	146	5.74 (2.34)	17
3	7.95 (3.02)	42	39	81	4.93 (1.80)	22
4	7.68 (1.99)	47	51	98	6.06 (1.88)	10
Control	8.21 (2.96)	19	16	35	6.42 (1.39)	5.7
Total	8.45 (3.21)	288	251	539	5.48 (2.18)	18.9

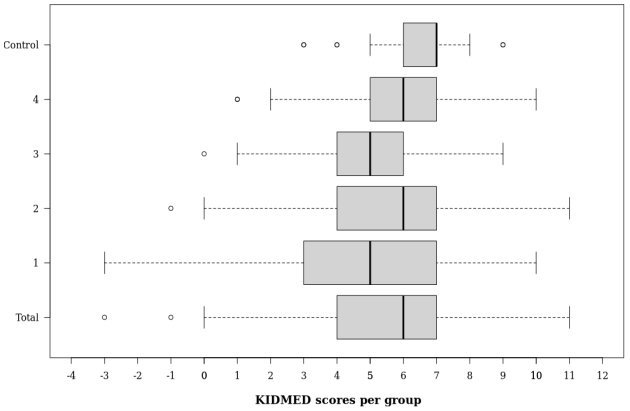

Figure 1: KIDMED score distributions by groups

No significant difference was observed between genders in terms of KIDMED scores. Chi-square analysis of individual dietary habits revealed several significant differences between the study groups and the control group.

Frequent fast-food consumption was more common in groups 1 and 3 compared to the control group ($p<0.001$). Regular fish consumption was less common in groups 1, 3, and 4 compared to the control group. Frequent sweets and candy consumption was more common in groups 1, 2, and 3 ($p<0.001$), while daily second fruit consumption was less frequent in groups 1, 2, and 3 ($p<0.05$). Consumption of commercially baked goods for breakfast was higher in groups 1 and 2 ($p<0.05$). These results suggest that children with ENT complaints are more likely to have dietary patterns characterized by higher consumption of processed foods and lower intake of nutrient-dense foods such as fish and fruits.

Children with allergic conditions had a significantly lower ($p<0.001$) mean KIDMED score of 4.85 (sd±2.10) than non-allergic children (5.76, sd± 2.23). When stratified by age, children older than 10 years (4.71, sd± 2.13) had significantly lower KIDMED scores ($p<0.001$) compared to those younger than 10 (5.87, sd± 2.11). This suggests a decline in dietary quality with increasing age. These findings demonstrate that poor dietary adherence is associated with increased ENT visits, particularly in children with recurrent infections and allergic rhinitis, and that allergic conditions and older age groups are linked to worse diet quality.

Twelve patients reported a history of allergic asthma, two reported a history of juvenile idiopathic arthritis, five reported a history of attention deficit/hyperactivity disorder, one reported a history of nasopharyngeal carcinoma, one reported a history of PFAPA syndrome, ten reported a history of atopic dermatitis, and two reported a history of epilepsy. When the other disease group (group 4) was examined, it was observed that the primary reasons for presentation were due to pathologies such as hearing problems, impacted cerumen, recurrent nosebleeds, lymphadenopathies, septal deviation, and tympanic membrane perforation.

DISCUSSION

To the best of our knowledge, this is the first study specifically focusing on the dietary patterns of children presented to the ENT outpatient clinic. Although all patients participating in the study had KIDMED scores indicating moderate diet quality, it is noteworthy that a moderate portion (18.9%) of the children had low scores. In the intergroup analysis, it was observed that the mean scores of patients with recurrent upper respiratory tract infections, allergic rhinitis and obstructive complaints were significantly lower than the control group. This difference was most pronounced in recurrent infections and allergic rhinitis. Negative dietary characteristics such as a diet low in fruit and fish and frequent consumption of sugary and processed foods were more evident compared to the control group. Additionally, according to our study, it is noteworthy that having an allergic condition and being over 10 years old are associated with lower KIDMED scores. In light of all the results, it can be seen that deterioration in diet quality is associated with ENT-related diseases in children, especially allergic rhinitis and recurrent infections.

The association between dietary habits and microbiota is widely recognised and several comprehensive treatment reviews can also be found in the recent literature (14). Diet has a decisive effect on the structure of the intestinal microbiota. This effect manifests itself in the prominence of certain bacterial groups over others and causes serious changes in intestinal pH, intestinal permeability, and bacterial metabolites, which in turn increase the tendency towards inflammation (15). Publications suggesting that diet quality and diversity can lead to increased microbial diversity and, as a result, reduced allergy outcomes are noteworthy. Diets rich in vitamins, long-chain fatty acids, and fiber are thought to be effective against atopy (16, 17). Substantial evidence demonstrates a strong association between microbiome variability and significant effects on human health. A higher proportion of Firmicutes relative to Bacteroidetes is associated with an increased incidence of allergies, asthma, and obesity (18). Omega-3 intake increases rates of Blautia species and may have immunoregulatory effects (19). The severity of infections due to Clostridium difficile is thought to be related to the composition of sugars in the diet (20). Probiotics containing Lactobacillus species have been shown to have a positive effect on not only intestinal problems, but also to reduce respiratory tract infections and to provide significant improvement in diseases such as allergic rhinitis, asthma and atopic dermatitis (21). A Western-style diet rich in processed sugars, saturated fats and low in fiber may be associated with dysbiosis and an increased risk of chronic inflammatory diseases such as otitis media and recurrent respiratory infections. At this point it can be argued that standard “Western Diet” is the origin of alterations in inflammatory processes and impairings in immunoregulation.

MD is a dietary pattern characterised by high-level intake of fruit, vegetables, pulses, mo-

derately high consumption of fish, low intake of saturated fat and meat products. It is predominantly plant-based but not exclusively vegetarian-oriented, while fast food, sweets, and pastries are atypical. MD has been recognized by UNESCO as a cultural heritage of humanity in 2010 (22). High-level adherence to a MD has been found to be beneficially over the gut microbiota and associated metabolome (23, 24).

A Western diet is characterized with increased gut permeability and metabolic endotoxemia. The available evidence shows that the gut microbiota of subjects who follow MD is significantly different from subjects that follow a Western diet. For this reason, it can be assumed that the gut microbiota of the subjects following a MD is able to prevent the onset of chronic non-communicable degenerative diseases (25).

Apart from its effects on the microbiome, it is suggested that MD strengthens immune function, antioxidant and anti-inflammatory activity due to its high content of micro and macro nutrients such as vitamins A, C and D, minerals such as iron, zinc and selenium, and fatty acids (monounsaturated and polyunsaturated omega 3 fatty acids) (26).

MD has been also demonstrated to be beneficial for the treatment of some metabolic disorders such as diabetes, obesity, inflammatory diseases and cardiovascular diseases (27). Consulting the literature on the relationship between allergies and MD suggests that MD has a protective effect on asthma. Although asthma and allergic rhinitis occur together quite frequently, the positive effect of MD on allergic rhinitis and other allergic conditions is controversial (28). There are also pre-existing studies on this subject, specifically for ENT diseases.

Children with chronic otitis media with effusion have a less diverse nasal microbial composition, compared to healthy children who have a more mixed bacterial profile (29). Similarly, there are many studies showing that bacterial biofilms may be associated with many chronic ENT diseases such as chronic otitis and sinusitis (30, 31). In a study conducted by Calatayud et al. (12) in 2021 reported that patients who received training on traditional MD and were followed up with a diagnosis of otitis media with effusion showed significant improvement in disease parameters at the end of 1 year.

It is noteworthy that the upper respiratory tract infection and allergic rhinitis groups exhibited the lowest scores within our study cohort. Although the scores of patients presenting with obstructive symptoms were relatively better, a significant decrease was observed in this group compared to the control group. The difficulties in making a differential diagnosis between these 3 groups, which constitute the largest part of the patients, and the fact that their pathophysiologies are multi-causal and intertwined at some points, makes it difficult to completely separate these diseases from one another. Consequently, we aimed to compare children with allergic conditions to those without, given the frequent observation of adenoid hypertrophy or recurrent otitis media in patients presenting without primary allergy complaints. This approach allowed us to isolate the potential impact of dietary factors on allergic conditions. Our findings indicate that dietary deterioration is most strongly associated with allergy, a conclusion consistent with existing literature.

Our study revealed that younger children (aged less than 10 years) had significantly higher KIDMED scores compared to older children (older than 10 years). Notably, fast food consumption and a tendency to skip breakfast were prominent among these groups. While it is often speculated that the increased energy and nutrient demands during rapid adolescent growth might lead to a higher consumption of energy-dense foods, such as fast food, the literature on this topic remains limited. Nonetheless, some studies do suggest an increase in processed food intake during adolescence (32).

Despite the strengths of our study, several limitations warrant discussion. First, the cross-sectional design prevents us from establishing causality between diet quality and ENT morbidity. Moreover, selecting patients who did not attend the ENT outpatient clinic as a control group would have been more appropriate. The small size of the control group, while permitting statistical analysis, reduces the reliability of results, particularly regar-

ding the examination of specific dietary habits such as consumption of processed food.

Additionally, dietary intake was assessed via the KIDMED questionnaire, which, although validated, relies on self-reported data and may be subject to recall bias. Future studies should incorporate objective dietary assessment methods—such as food diaries or biomarkers—to corroborate these findings.

Furthermore, while significant associations between diet quality and ENT-related conditions were observed, the study did not account for other potential confounders, such as socioeconomic status, physical activity, or environmental exposures. Future research should control for these variables to better isolate the effects of diet on ENT health. Finally, emerging evidence on the gut-lung axis suggests that microbiome-mediated mechanisms may play a role in linking diet to ENT health; therefore, further investigations into how dietary changes influence respiratory microbiota could provide valuable insights into new preventive strategies. In conclusion, these findings suggest that dietary interventions—particularly those promoting a Mediterranean diet—may help reduce ENT morbidity, especially recurrent infections. Moreover, given the significant differences observed between allergic and non-allergic children, targeted dietary strategies such as reducing fast food consumption and encouraging the regular intake of fish and fruit may be especially beneficial for managing allergic conditions.

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