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Microsurgical Subinguinal or Laparoscopic Palomo Varicocelectomy in Adolescent Patients, Which Technique is Better?

Adölesan Varikoselektomide Mikrocerrahi Subinguinal veya Laparoskopik Palomo, Hangi teknik daha iyi?

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Ethics Committee Approval: The study was approved by Eskisehir Osmangazi University Clinical Research Ethics Committee (Decision No: 06, Date: 02.05.2024)

Patient Consent: It is a retrospective patient screening study. No changes were made in the follow-up and treatment process of the patients. Written consent is obtained from all patients for the surgery to be performed before the surgical procedure and their data can be used in scientific research.

Authorship Contributions: Concept: DD, Design: DD Data Collection or Processing: DD, UB, IU, Analysis or Interpretation: IU, BT Literature Search: DD Author: DD

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Abstract: The indications for surgical intervention in adolescent varicocele cases are restricted. When intervention is necessary, treatment options include the open subinguinal approach, laparoscopic surgery, or embolization. This study aimed to compare outcomes between microsurgical sub-inguinal varicocelectomy and laparoscopic varicocelectomy in adolescent patients. Forty-nine patients under 18 years old who underwent varicocelectomy between 2010 and 2023 were categorized into two groups based on the surgical approach 19 patients underwent laparoscopic varicocelectomy by pediatric urologists, and 30 patients underwent subinguinal varicocelectomy by the urology department. Patient records were retrospectively analyzed for age, preoperative symptoms, physical examination findings, ultrasound results, surgical techniques, and postoperative outcomes. There was no significant difference in recurrence rates between subinguinal varicocelectomy and laparoscopic varicocelectomy techniques. However, statistically significant differences were noted in operative duration, hospital stay length, and patient age at the time of surgery between the pediatric urology and urology department groups employing different techniques. Both subinguinal varicocelectomy and laparoscopic varicocelectomy techniques can be considered based on the surgeon's expertise and institutional resources. Regardless of the approach chosen, preserving arterial and lymphatic structures to maintain testicular blood supply and minimize complications is paramount.
Keywords: Laparoscopic Palomo procedure, Microsurgical Varicocelectomy,Varicocele

Özet: Adölesan varikosel vakalarında cerrahi müdahale endikasyonları kısıtlıdır. Müdahale gerekli olduğunda, tedavi seçenekleri arasında açık subinguinal yaklaşım, laparoskopik cerrahi veya embolizasyon yer almaktadır. Bu çalışmada adolesan hastalarda mikrocerrahi subinguinal varikoselektomi ve laparoskopik varikoselektomi sonuçları karşılaştırıldı. 2010-2023 yılları arasında varikoselektomi uygulanan 18 yaş altı 49 hasta cerrahi yaklaşıma göre iki gruba ayrıldı. 19 hastaya pediatrik ürologlar tarafından laparoskopik varikoselektomi, 30 hastaya üroloji bölümü tarafından subinguinal varikoselektomi uygulandı. Hasta kayıtları yaş, ameliyat öncesi semptomlar, fizik muayene bulguları, ultrason sonuçları, cerrahi teknikler ve ameliyat sonrası sonuçlar açısından retrospektif olarak analiz edildi. Laparoskopik varikoselektomi ve subinguinal varikoselektomi teknikleri arasında nüks oranları açısından anlamlı bir fark yoktu. Bununla birlikte, farklı teknikler kullanan çocuk ürolojisi ve üroloji bölümü grupları arasında ameliyat süresi, hastanede kalış süresi ve ameliyat sırasındaki hasta yaşı açısından istatistiksel olarak anlamlı farklılıklar kaydedildi. Cerrahın uzmanlığına ve kurumsal kaynaklara bağlı olarak hem subinguinal varikoselektomi hem de laparoskopik varikoselektomi teknikleri düşünülebilir. Seçilen yaklaşım ne olursa olsun, testiküler kan akımını sürdürmek ve komplikasyonları en aza indirmek için arteriyel ve lenfatik yapıları korumak çok önemlidir.
Anahtar Kelimeler: Varikosel, Palomo Varikoselektomi, Subinguinal Mikrocerrahi Varikoselektomi

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1. Introduction

Varicocele, which is characterized by dilatation of the pampiniform plexus and internal spermatic veins, accounts for 15-20% of primary male infertility cases. Numerous studies have shown a direct correlation between delayed treatment of varicocele and infertility (1).

Currently, there is no consensus on the optimal age and technique for varicocele treatment in children and adolescents. Known and applied treatment options include open subinguinal approach, laparoscopic surgery or embolization methods. Laparoscopic procedures may involve retroperitoneal access, while open inguinal and subinguinal approaches may utilize magnification tools such as microscopes or magnifying rings (2).

In this study, we retrospectively compared the outcomes of varicocelectomy using laparoscopic varicocelectomy (LV) and microsurgical subinguinal varicocelectomy (SV).

2. Materials and Methods

This retrospective study involved 49 adolescent patients who underwent surgical treatment for varicocele between February 2010 and February 2023. Patients were categorized into two groups based on the surgical approach: Group 1 (LV) and Group 2(SV), and their data were compared retrospectively. Parameters recorded included age, preoperative symptoms, physical examination findings, ultrasonography results, surgical techniques, and postoperative outcomes.

Varicocele examination included scrotal inspection, palpation, and the Valsalva maneuver performed in both standing and lying positions. Ultrasonography was utilized to assess differences in testicular volume, diameter of internal spermatic veins, and the presence of venous reflux. Significant testicular volume difference was defined as ≥10% (1). Internal spermatic vein diameter greater than 2-3 mm and the presence of spontaneous or Valsalva-induced reflux were considered indicative of varicocele.

Patients demonstrating varicose veins on postoperative ultrasound and clinical examination were classified as experiencing recurrence. Those with ultrasound findings suggestive of varicocele but lacking clinical symptoms and palpable varicose veins were categorized as having subclinical recurrence.

Ethical approval for this study was obtained from the Non-Interventional Ethics Committee of Eskisehir Osmangazi University Faculty of Medicine under Decision No: 6 dated 05.02.24.

Statistical Analysis

The statistical analysis employed in this study utilized the Independent Samples T-Test. Statistical calculations were performed using Jamovi (Jamovi for MacOS, v.2.3.28.0). A significance level of $p < 0.05$ was considered statistically significant.

Surgical Techniques

Laparoscopic Palomo Technique

The surgical procedure followed the Laparoscopic Palomo technique.

1-The patient was positioned in the semilateral position under general anesthesia. To facilitate access and visibility, the Trendelenburg position was used to displace the intestines.

2-Initial access to the abdomen was gained through a 5 mm port inserted at the umbilicus, using a 30-degree optical lens for visualization. Carbon dioxide (CO2) gas was insufflated into the abdomen to maintain a pressure of 12-14 cmH2O. Additional 5 mm ports were placed—one near the midline close to the pubis and another on the right lateral midline between the umbilical and pelvic ports.

3-The peritoneal cavity was traversed through a peritoneal window created approximately 5-6 cm cranial to the vas deferens and internal ring, at the point where the internal spermatic artery and vein were located. All vascular structures were meticulously ligated.

The literature emphasizes the critical balance between preserving the spermatic artery to protect testicular function and ligating it to prevent a recurrence. It is noted that collateral circulation from the vas deferens and cremasteric artery can adequately supply blood to the testis despite ligation of the spermatic artery away from the internal ring.

Additionally, ligating the internal spermatic artery may potentially reduce venous return and lower the local temperature by alleviating vascular pressure in the region.

4-Proximal and distal application of two 5 mm endo-clips was performed without distinguishing between arteries and lymphatics, followed by cutting the vessel at its midpoint. The peritoneal window created during the procedure was left open (Figure 1 A-B-C).

Subinguinal Microscopic Varicocelectomy

Subinguinal microscopic varicocelectomy was performed under general or spinal anesthesia, the procedure was started by making a transverse incision approximately 2 cm in length, positioned 1 cm below the external inguinal ring. The surgical steps proceeded as follows:

1. The skin, subcutaneous tissues, and superficial fascia were incised to access the spermatic cord.

2. The spermatic cord was carefully isolated and suspended.

3. By gently manipulating the testis towards the incision, the gubernacular and external spermatic veins were exposed, ligated, and divided.

4. Subsequently, the external spermatic fascia was opened, followed by meticulous dissection under a microscope brought into the surgical field.

5. The internal spermatic fascia was carefully opened to reveal and preserve the internal spermatic artery(s), lymphatics, and vas deferens.

6. Under microscopic visualization, all visible internal spermatic veins were identified, ligated, and transected (Figure 2).

This technique emphasizes precise anatomical dissection and preservation of vital structures to minimize postoperative complications and ensure optimal outcomes in varicocele treatment.

3. Results

Data from 19 patients who underwent LV in group 1 and 30 who underwent SV in group 2 were evaluated. The mean age was 14.21 years (11-17 years) in Group 1 and 17.1 years (14-18 years) in Group 2. When the mean age of the patients was compared, it was 14.2 years in patients who underwent LV and 17.1 years in patients who underwent SV. A significant difference of $p < 0.001$ was observed between the two groups.

The main complaint in both groups was pain and swelling in the scrotum. In group 1, left varicocelectomy was performed in all patients, 14 and 5 patients were suffering from grade 2 and grade 3 varicocele, respectively. In group 2, left varicocelectomy was performed in 28 patients and bilateral varicocelectomy in 2 patients with 3 of all patients being grade 1, 16 of them being grade 2 and 11 of them being grade 3 varicocele.

The operation time was 24.9 minutes (20-25) in Group 1 and 40.5 (30-50) minutes in Group 2. When the operation times were compared, a significant difference was found in favor of group 1, $p<0.001$.

The hospitalization period of the patients in group 1 was 1 day. In group 2, the hospitalization period was 0-1 day (0.66) days. When the hospitalization duration of the patients was analyzed, a significant difference was found $p <0.004$.

Recurrence was detected in three patients in group 1 and they were operated on again. Hydrocele developed in one patient and hydrocelectomy was performed. One patient had mild hydrocele which resolved with follow-up. In group 2, recurrence of varicocele was observed in 2 patients. One patient developed pain. In 2 patients, minimal hydrocele was observed with follow-up. There was no significant difference between groups 1 and 2 in terms of recurrence.

Statistical analyses are given in Table 1

Levene's test is significant ($p < 0.05$), suggesting a violation of the assumption of equal variance.

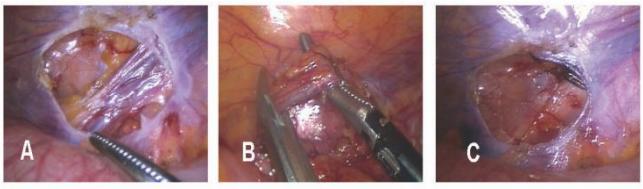

Figure 1. The key stages of the laparoscopic Palomo procedure for varicocele treatment.

A: The retroperitoneal window is opened during the laparoscopic Palomo operation.

B: Visualization of the testicular artery and vein.

C: Ligation of the testicular artery and vein using an endoclip just above the internal inguinal ring.

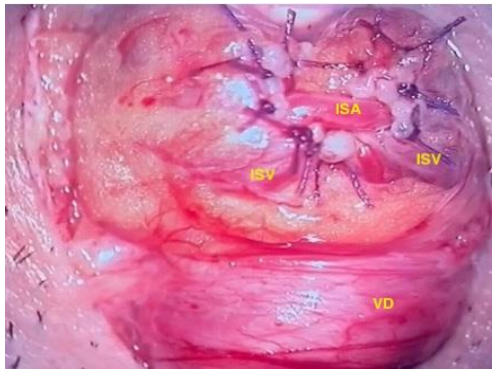

Figure 2. The anatomical structures identified and preserved during the microsurgical procedure for varicocele treatment. ISA: Internal Spermatic Artery, ISV: Internal SpermatiC Vein, VD: Vas Deferens

Table 1. Independent Samples T-Test, Group Descriptives

	Grup	N	Mean±Sd	Median	P
Age	Grup 1 (LV)	19	14.21±1,75	14	<.001
	Grup 2 (SV)	30	17.1±1,845	17.00	
Duration of surgery	Grup 1 (LV)	19	24.95±4,02	25	<.001
	Grup 2 (SV)	30	40.233±6,956	41	
Hospitalisation	Grup 1 (LV)	19	1±0,479	1	0.004
	Grup 2 (SV)	30	0.667±0.47	1	

4. Discussion

The incidence of varicocele in adolescents is approximately 15%, one of the most common correctable anomalies in adolescent males (3). A fundamental challenge associated with adolescent varicocele is to determine which patients require treatment. Recommendations suggest monitoring testicular volume loss or growth arrest as the primary determinant for intervention to maintain or increase fertility (4). The American Society for Reproductive Medicine Practice Committee recommends that adolescent varicocele patients with objectively assessed testicular volume loss may be candidates for varicocele repair (5). Many guidelines consider a testicular volume difference of more than 20% as an indication for surgery (6).

In a study conducted on fifty-seven children, it was found that a volume difference of 10-20% between the right and left testes was associated with a total motile sperm count below normal in 11% of cases. When the volume difference exceeded 20%, the total motile sperm count was found to be below normal in 59% of the cases (7). The literature suggests that testicular dysfunction can be detected long before the onset of testicular asymmetry (8). However, due to the difficulties of semen analysis in pediatric patients, evaluation of testicular volumes becomes very important. In our study, decreased testicular volumes were used as a criterion to decide on surgery.

A statistically significant difference was found when the age at surgery was compared $p<0.001$ (Table 1). The mean age of the patients was 14.2 years in pediatric urology and 17.1 years in the urology clinic. The difference was thought to be related to the patient group referred to the clinics. While adolescent and adult patients were referred to the urology clinic, pediatric and adolescent patients were referred to pediatric urology.

In adult infertile patients, microsurgery using an inguinal or subinguinal approach has reported high success rates and low morbidity despite relatively long operative times (9,10). Among pediatric urologists, laparoscopic approaches are preferred in 38% of cases (11). This preference may be due to the familiarity and comfort of the team with the technique (2). In our study, the laparoscopic approach was preferred in the pediatric urology

clinic, whereas microsurgical procedure was preferred in the urology clinic. The mean duration of laparoscopic procedures was 24.9 minutes (range: 20-35), while microsurgical procedures lasted 40.5 minutes (range: 30-50).

Student's t-test showed a significant difference of $p<0.001$ (Table 1). The longer duration of open surgery may be attributed to the use of a microscope (12).

The varicocele recurrence rate after surgical repair varies between 1% and 45% depending on the procedure and the use of magnification. Venography has identified recurrent varicoceles arising from collateral periarterial, parallel inguinal, midretroperitoneal, gubernacular, and trans-scrotal veins (13).

In a study published in 2016 involving adult patients who underwent varicocelectomy with subinguinal and high inguinal microsurgery, total recurrence and hydrocele rates 24 months after surgery was reported as 0% and 1.3%, respectively (12). In our study, recurrence was observed in 2 of 30 patients who underwent microsurgery. These patients were followed up closely because they did not have reoperation complaints.

Laparoscopic application of the Palomo technique has a success rate of 98-99 % but is accompanied by a hydrocele rate ranging from 12-23 % (14). In contrast, studies report a recurrence incidence in adolescent varicocele ranging from 0-31% for open varicocelectomy and 0-8% for the laparoscopic technique. When the laparoscopic technique is performed with the preservation of lymphatics, recurrence rates have been reported to be 0-2% and hydrocele rate has been reported as 14% in patients whose lymphatics are not preserved (15).

In our study, only one patient required reoperation after laparoscopic varicocelectomy and mild hydrocele was observed in one patient. However, no hydrocele was detected in the microsurgery group. No significant difference was found between the two groups.

An analysis of 278 varicocelectomy operations ranging in age from 8 to 40 years revealed that after subinguinal microsurgical varicocelectomy, 88% of cases had complete relief of pain complaints and 5% had partial relief (16). In another 2017 study, it was reported that approximately 90% of patients with painful varicocele experienced symptomatic relief after varicocele repair (17). A meta-analysis of twelve studies concluded that the subinguinal approach with microsurgical technique is more effective in pain relief. Although blunt pain relief performed better than sharp pain relief, no significant relationship was found between varicocele severity and pain relief (18).

In our study, although scrotal pain was the most common complaint, persistent pain was observed in 4 of 19 patients who underwent LV during postoperative outpatient clinic controls. In the SV group, persistent pain was found in one patient.

When the length of hospital stay of the patients was evaluated, a significant difference of $p < 0.004$ was found between the two groups. This was thought to be related to the procedures of the clinic regarding the follow-up periods.

The meta-analysis of the twelve RCTs revealed that varicocele treatment improved testicular volume (mean difference 1.52 ml, 95% CI 0.73-2.31) and increased total sperm concentration (mean difference 25.54, 95% CI 12.84-38.25) when compared with observation. Lymphatic sparing surgery significantly decreased hydrocele rates ($p=0.02$) and the OR was 0.08 (95% CI 0.01, 0.67). Due to the lack of RCTs, it was not possible to identify a surgical technique as being superior to the others. It remains unclear whether open surgery or laparoscopy is more successful for varicocele treatment (OR ranged from 0.13 to 2.84) (19)

5. Conclusion

There is no clear consensus in the literature about the approach to adolescent varicocele. In our study, the data of patients who underwent LV and those who underwent microsurgical SV were compared in terms of age, pain status, operation time, hospital stay, postoperative pain, and complications. While a significant difference was observed in favor of the laparoscopic varicocelectomy group in terms of operation time, no significant difference was found in terms of recurrence frequency and complications. In our study, we found that LV may be a more effective treatment in terms of anesthesia time. Both methods may be preferred according to the experience and knowledge of the surgeon. More case reports are needed to determine which management is best.

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Serum Asprosin Levels in Patients with Hashimoto's Thyroiditis

Hashimoto Tiroiditi Olan Hastalarda Serum Asprosin Düzeylerinin araştırılması

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Ethics Committee Approval: The study was approved by Kayseri City Clinical Research Ethical Committee (Decision no: 600, Date: 10.03.2022).

Informed Consent: All participants in this study provided informed consent prior to participation. They were fully informed about the study's purpose, procedures, risks, and benefits. Participation was voluntary, and participants had the right to withdraw at any time without penalty. Data confidentiality was ensured, and all information was anonymized for analysis.

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Abstract: Asprosin is an orexigenic hormone secreted by adipose tissue, known to stimulate appetite. This study aimed to explore the relationship between appetite reduction, a commonly observed symptom in hypothyroidism, and serum asprosin levels, while also investigating potential metabolic implications beyond appetite regulation.We compared serum asprosin levels in 28 patients with hypothyroidism secondary to newly diagnosed Hashimoto's thyroiditis and 16 healthy controls. Additionally, serum asprosin levels were reassessed after patients achieved a euthyroid state following levothyroxine treatment, to evaluate any potential changes in relation to thyroid hormone normalization.There was no significant difference in serum asprosin levels between hypothyroid patients and healthy controls. No statistically significant difference was found between serum asprosin levels and thyroid function status. The serum asprosin levels were 4.8 ± 1.2 ng/mL in the hypothyroid group and 4.9 ± 1.1 ng/mL in the euthyroid group (p = 0.89). Furthermore, no significant change in asprosin levels was observed following levothyroxine treatment, compared to pre-treatment levels, suggesting that asprosin levels are not directly influenced by thyroid function.Ghrelin, an orexigenic hormone, is typically low in hypothyroid patients, contributing to reduced appetite. However, our study did not observe a similar decrease in asprosin levels in these patients. This suggests that, unlike ghrelin, asprosin may not be significantly affected by hypothyroidism or its treatment. Additionally, the lack of change in asprosin levels after treatment raises questions about its role in broader metabolic processes, beyond appetite regulation.The findings suggest no significant relationship between hypothyroidism and serum asprosin levels, indicating that asprosin may not play a central role in appetite reduction in hypothyroid patients.
Keywords: Hashimoto, Hypothyroidism, Adipose tissue, Asprosin

Özet: Asprosin, yağ dokusu tarafından salgılanan, iştahı uyaran bir hormondur. Bu çalışmanın amacı, hipotiroidizmde yaygın olarak gözlemlenen iştah azalması semptomu ile serum asprosin düzeyleri arasındaki ilişkiyi incelemek ve ayrıca iştah düzenlemesinin ötesinde metabolik etkilerini araştırmaktır.
Hipotiroidizm tanısı almış 28 Hashimoto tiroiditi hastası ile 16 sağlıklı kontrol grubunun serum asprosin düzeyleri karşılaştırıldı. Ayrıca, hastaların levotiroksin tedavisi sonrası ötiroid duruma ulaşmalarının ardından serum asprosin düzeyleri yeniden değerlendirilerek, tiroid hormonlarının normale dönmesiyle ilişkili herhangi bir değişiklik olup olmadığı incelendi.Hipotiroidizm hastaları ile sağlıklı kontrol grubunun serum asprosin düzeyleri arasında anlamlı bir fark gözlemlenmedi. Hipotiroid grup serum asprosin düzeyleri 4.8 ± 1.2 ng/mL, ötroid grup serum asprosin düzeyleri ise 4.9 ± 1.1 ng/mL olarak saptanmıştır (p = 0.89). Ayrıca, levotiroksin tedavisi sonrası serum asprosin düzeylerinde, tedavi öncesi seviyelere kıyasla belirgin bir değişiklik görülmedi. Bu durum, asprosin düzeylerinin doğrudan tiroid fonksiyonlarından etkilenmediğini göstermektedir.Hipotiroid hastalarında iştahı azaltan bir oreksijenik hormon olan ghrelin genellikle düşüktür. Ancak, bu çalışmamızda asprosin düzeylerinde benzer bir azalma gözlemlenmemiştir. Bu durum, asprosin'in ghrelin'den farklı olarak hipotiroidizm veya tedavisinden önemli ölçüde etkilenmediğini düşündürmektedir. Ayrıca, tedavi sonrası asprosin düzeylerinde herhangi bir değişiklik gözlenmemesi, bu hormonun iştah düzenlemesinin ötesinde daha geniş metabolik süreçlerdeki rolü hakkında soru işaretleri oluşturmuştur.Elde edilen bulgular, hipotiroidizm ile serum asprosin düzeyleri arasında anlamlı bir ilişki bulunmadığını ve asprosin'in hipotiroid hastalarında iştah azalmasında merkezi bir rol oynamadığını göstermektedir.
Anahtar Kelimeler: Hashimoto Tiroiditi, Hipotiroidizm, Yağ Dokusu, Asprosin

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1. Introduction

Thyroid hormones regulate the functions of many organs and tissues, such as the heart, liver, brain, skeletal muscle, and adipose tissue. Triiodothyronine (sT3) increases lipid turnover in adipocytes and appetite in the hypothalamus. TSH and thyroid hormones control adipocyte differentiation and proliferation. When excess calories are consumed, leptin is released from the white adipose tissue. Leptin increases the synthesis of TSH and thyroid hormones, suppresses appetite, and increases thermogenesis and lipolysis[1]. Leptin has been associated with obesity, insulin resistance, and dyslipidemia. Leptin increases obesity, insulin resistance, and dyslipidemia. As TSH levels increase in patients with hypothyroidism, the risk of weight gain and metabolic syndrome increases[2]. Hypothyroidism may be complicated by obesity, hyperlipidemia, and hypertension. Leptin levels and insulin resistance are typically high, while adiponectin levels are low in hypothyroid patients[3].

In patients with hypothyroidism, appetite decreases because their sense of taste and smell is impaired. The disorder in the sense of taste and smell improves with thyroid hormone treatment[4]. It has been shown that serum ghrelin, an orexigenic (appetite-increasing) hormone released from adipose tissue in patients with hypothyroidism, is low, but normalizes after thyroid hormone replacement[5]. Apolipoprotein A4, another hormone secreted by adipose tissue, plays a role in appetite and satiety. This hormone is elevated in patients with hyperthyroidism but decreases following treatment, and its levels are low in hypothyroid patients[6].

Asprosin is a protein hormone released from white adipose tissue after fasting and increases glycogenolysis and gluconeogenesis in the liver[7]. It crosses the blood-brain barrier and exerts an orexigenic effect. In animal studies, eating and weight gain were reduced in obese mice administered anti-asprosin antibodies[8]. Asprosin increases inflammation in skeletal muscles, leading to insulin resistance. It also reduces cAMP-dependent insulin secretion in the pancreas. It increases in the blood of patients with diabetes and may be a target for treatment[9]. It has been shown that asprosin levels in blood and saliva increase in obese individuals in parallel with body mass index, while decreasing in lean individuals[10].

In this study, we aimed to investigate the relationship between the decrease in appetite observed in patients with hypothyroidism and asprosin levels. Therefore, we compared the serum asprosin levels of patients with hypothyroidism secondary to Hashimoto's thyroiditis at the time of diagnosis and after they became euthyroid after treatment. We also compared the serum asprosin levels between the hypothyroid and healthy control groups.

2. Materials and methods

Blood samples were collected from 28 patients who underwent Kayseri City Hospital Internal Medicine Polyclinic between April 1, 2022, and April 1, 2024, and were diagnosed with hypothyroidism due to Hashimoto's thyroiditis, during diagnosis and after they became euthyroid after treatment. In addition, blood samples were collected from 16 volunteers who did not have any disease and had normal thyroid hormone levels as healthy controls.

Inclusion criteria were: (1) patients aged between 18 and 65 years, (2) diagnosis of hypothyroidism confirmed by clinical and laboratory findings, (3) patients who had not been treated with thyroid hormone replacement therapy for at least 3 months prior to the study.

Exclusion criteria were: (1) patients with other endocrine disorders, (2) patients on medications affecting thyroid function, (3) patients with a history of obesity-related metabolic diseases.

Power Analysis and Sample Size Calculation

An a priori power analysis was performed using G*Power software to determine the required sample size for comparing two independent means via a t-test. The analysis was conducted under the following parameters:

The results of the power analysis indicated that for a significant effect size (d = 0.8), a desired power level of 0.80, and an alpha of 0.10, the required sample sizes were 11 participants for Group 1 and 23 participants for Group 2. Therefore, the total sample size for the study was determined to be 34 participants. Based on these findings, the minimum sample size was set at 23 for the patient group and 11 for the control group.

The noncentrality parameter (δ) was calculated to be 2.18, with a critical t-value of 1.31 and 32 degrees of freedom (df). The actual power of the test was estimated at approximately 0.81, which meets the target power threshold.

The study was approved by the ethics committee of Kayseri City Hospital (10.03.2022/600).

This was a case-control study. PS version 3.0 package program was used to determine the number of samples.

Before obtaining a blood sample, the volunteers were informed, volunteer consent forms were filled out, and their consent was obtained. Blood samples were taken during morning fasting, as tsh and asprosin levels may be affected by satisfaction and diurnal rhythm. Blood samples were delivered to the Kayseri City Hospital Medical Biochemistry laboratory, centrifuged, and stored at -80 °C. When the target number of patients and healthy volunteers was reached, the stored blood samples were removed from the refrigerator and analyzed, and the results were recorded. Serum asprosin levels were measured using a commercially available ELISA kit (Catalog number: 201-12-7193, Company Name: Sunredbio).

The results were entered into the SPSS software. As a statistical method, Shapiro-Wilk test was used to determine normal distribution, Independent Samples T-Test was used for parametric comparisons, and Mann-Whitney U test was used for non-parametric comparisons. In case control comparisons, the paired samples t-test was used for parametric data, and the Wilcoxon signed-rank test was used for non-parametric data. Spearman's correlation analysis was used for correlation analysis.

3. Results

A total of 44 patients, including 28 diagnosed with hypothyroidism secondary to newly diagnosed Hashimoto's thyroiditis and 16 volunteers in the healthy control group, were included in the study. The duration of euthyroid status after treatment was 187 ± 25 days. No significant difference was detected between the hypothyroid and healthy control groups in terms of age, sex, glucose, Creatinine, ALT, AST, GGT, cholesterol, and asprosin levels. The body mass index of patients with hypothyroidism was significantly higher than that of the healthy control group (Table 1).

Table 1. Comparison of hypothyroidism and healthy control groups

		Hypothyroidism n (28)	**Healty control n (16)**	**P value**
Age,mean±SD		39.89±10.94	36.63±9.38	0.322
Gender	**Female**	22 (%78.6)	10 (%62.5)	0.303
	Male	6 (%21.4)	6 (%37.5)	
BMI,kg/m^2,mean±SD		29.34±7.64	24.04±2.25	**0.004**
Glucose,mg/dL,mean±SD		87.4±11.41	87.8±5.77	0.908
Creatinine,mg/dL,mean±SD		0.76±0.16	0.77±0.15	0.932
AST,U/L,median(min-max)		18 (10-35)	15 (11-28)	0.041
ALT,U/L,median(min-max)		15 (5-38)	15 (8-39)	0.940
GGT,U/L,median(min-max)		14 (6-61)	16 (6-33)	0.922
TSH,mU/L,median(min-max)		14.25 (5.06-245.8)	1.45 (0.41-3.87)	**<0.001**
Free T4,ng/L,median(min-max)		8.45 (1.2-12.1)	12.6 (9.6-14.8)	**<0.001**
Cholesterol,mg/Dl,median(min-max)		177 (140-288)	189 (114-224)	0.831
LDL,mg/dL,median(min-max)		119 (72-205)	123 (47-153)	0.800
TG,mg/dL,median(min-max)		120 (43-345)	87 (42-238)	0.087
Asprosin,ng/mL,median(min-max)		50.78 (41.47-202.68)	56.17 (18.87-115.43)	0.380

After levothyroxine treatment given to patients with hypothyroidism and after the patients became euthyroid, no significant difference was detected in asprosin levels when compared with before treatment. Total cholesterol and LDL levels were significantly lower after treatment than before treatment (Table 2).

Table 2. Comparison of biochemical parameters and asprosin level before and after treatment

	Before treatment	After treatment	P value
Glucose,mg/dL,median(min-max)	90 (52-107)	92 (75-192)	0.432
Creatinine,mg/dL,mean±SD	0.76±0.16	0.72±0.17	0.285
AST, U/L,mean±SD	18.9±5.63	17.5±4.53	0.091
ALT,U/L,median(min-max)	15 (5-38)	14 (6-54)	0.659
GGT,U/L,median(min-max)	14 (5.61)	14 (9-23)	0.324
TSH,mU/L,median(min-max)	14.25 (5.06-245.8)	2.72 (0.46-27.4)	**<0.001**
Free T4,ng/L,median(min-max)	8.45 (1.2-12.1)	13.5 (21.3)	**<0.001**
Cholesterol,mg/dLmedian(min-max)	177 (140-288)	174 (126-304)	**0.024**
LDL,mg/dL,median(min-max)	119 (72-205)	108 (59-237)	**0.046**
TG,mg/dL,median(min-max)	120 (43-345)	120 (73-367)	0.510
Asprosin,ng/mL,median(min-max)	50.8 (41.5-202.7)	56.4 (44.8-119.4)	0.142

When a correlation analysis was performed, no relationship was detected between asprosin, TSH, and free T4 levels. While there was a positive relationship between TSH and AST levels, a negative relationship was found between free t4 and AST levels (Table 3).

Table 3. Correlation analysis results between asprosin and other parameters

		BMI	Glucose	Cre	AST	ALT	GGT	T.Col	LDL	TG	TSH	fT4
Asprosin	**Correlation Coefficient**	0.029	-0.041	-0.143	0.087	0.238	0.173	-0.058	-0.106	0.135	0.028	0.002
	Sig. (2-tailed)	0.861	0.796	0.360	0.577	0.125	0.285	0.719	0.511	0.400	0.857	0.992
TSH	**Correlation Coefficient**	0.215	-0.001	0.094	0.490	0.111	-0.033	-0.026	-0.048	0.259	1	-0.879
	Sig. (2-tailed)	0.189	0.994	0.550	**0.001**	0.478	0.838	0.870	0.764	0.103	-	**<0.001**
Free t4 (fT4)	**Correlation Coefficient**	-0.336	-0.097	-0.079	-0.373	-0.002	-0.033	-0.102	-0.075	-0.345*	-0.879	1
	Sig. (2-tailed)	**0.036**	0.534	0.617	**0.014**	0.991	0.838	0.525	0.642	**0.027**	**<0.001**	-

4. Discussion

Serum ghrelin, an orexigenic hormone released from adipose tissue, is typically found to be low in patients with hypothyroidism but returns to normal following thyroid hormone replacement therapy[5,11]. In contrast, asprosin, another orexigenic hormone also secreted by adipose tissue, did not show a reduction in levels in our study. Although reduced appetite in hypothyroidism is likely mediated by changes in ghrelin, our findings suggest that asprosin may not play a significant role in appetite regulation in this condition. Additionally, no significant changes in asprosin levels were observed after thyroid hormone replacement, further supporting the idea that asprosin may not be directly involved in appetite suppression in hypothyroid patients.

Asprosin, known for its appetite-stimulating effects, may interact with other metabolic factors in complex ways. Despite its potential role in appetite regulation, our results indicate that it does not significantly influence the appetite suppression seen in hypothyroidism. In this context, the orexigenic effects of asprosin might be overshadowed by other mechanisms, such as changes in ghrelin levels, which are known to be more influential in appetite control in hypothyroid individuals.

Previous animal studies suggested that hypothyroidism could lead to lower asprosin

levels[12]. However, this was not replicated in our human study, where we found no significant correlation between thyroid hormone levels and asprosin concentrations. This discrepancy could be due to the differing physiological mechanisms of asprosin in humans and animals, which may not have been fully captured in the current research.

The lack of a relationship between asprosin and glucose levels in our study may be explained by the exclusion of diabetic patients from the cohort. Similarly, no significant correlations were found between asprosin levels and cholesterol or liver enzymes in the hypothyroid group.

Additionally, the duration of time it took for the patients to reach euthyroid status after treatment was 187 ± 25 days. This information is important as it could potentially influence the serum asprosin levels, which may vary according to thyroid function status. However, we did not observe a significant correlation between the thyroid function normalization and asprosin levels in this study.

In line with some earlier studies, such as that by Hussein et al. (2024), which investigated asprosin levels in patients with double diabetes and hypothyroidism, our findings also highlight the complexity of the relationship between asprosin and thyroid function. Hussein et al. reported elevated asprosin levels in patients with both double diabetes and hypothyroidism, suggesting that asprosin might play a role in insulin resistance and glucose metabolism alterations. However, unlike their findings, we observed no significant difference in asprosin levels between hypothyroid and euthyroid patients. This discrepancy could be due to differences in study design, sample size, or the specific patient populations involved. Hussein et al.'s study emphasized the importance of insulin resistance as a factor influencing asprosin levels, which might explain the higher levels observed in their cohort. Our study, however, did not explore insulin resistance markers as extensively, which may be a factor contributing to the lack of significant findings in relation to asprosin levels[13].

Our study did not find a statistically significant difference between serum asprosin levels in hypothyroid and euthyroid patients, which may seem surprising given the potential association of thyroid dysfunction with altered appetite regulation. However, this study contributes valuable insights into the complex interplay between thyroid hormones and asprosin, a hormone involved in appetite regulation. While some previous studies have suggested a link between thyroid dysfunction and altered asprosin levels, our findings add to the growing body of literature by highlighting that the relationship between thyroid function and asprosin may not be as straightforward as initially thought.

It is important to acknowledge that our study provides an early glimpse into this area, and the results should be interpreted in the context of several limitations, including the small sample size. Despite these limitations, our findings lay the groundwork for future studies that may explore this relationship more comprehensively, possibly incorporating larger, more diverse patient populations and longitudinal designs.

Furthermore, while the study did not reveal a clear relationship between thyroid function and serum asprosin levels, it highlights the need for further research to investigate the potential role of asprosin in appetite regulation and its interaction with thyroid function. Asprosin's complex role in metabolism and energy homeostasis suggests that it may influence other factors beyond thyroid hormone levels, and understanding these mechanisms could have important clinical implications in the management of thyroid-related disorders.

5. Conclusion

No significant relationship was found between hypothyroidism and serum asprosin levels, suggesting that asprosin may not be involved in the appetite reduction commonly observed in hypothyroid patients. Further research is needed to fully understand asprosin’s orexigenic effects and its role in metabolic disorders, particularly in relation to thyroid function and appetite regulation.

6. Limitations

The overweight status of the patient group could have influenced the results of this study. The appetite levels of overweight individuals may differ, potentially affecting asprosin levels. In the initial power analysis of this study, an alpha value of 0.10 was used. This could lead to an increased false positive rate, and the smaller sample size (28 patients in the study group) may limit the robustness of the findings. The small sample size limits the generalizability of the findings. Larger studies with broader sample sizes would provide more robust results. This study did not assess the appetite levels of the patients or controls. A more objective evaluation of appetite could have strengthened the

study's conclusions and provided clearer insight into the relationship between asprosin levels and appetite.

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Evaluation of the Knowledge Levels of Family Medicine Assistants Receiving Specialty Training in İzmir About Pressure Ulcer

İzmir'de Uzmanlık Eğitimi Alan Aile Hekimliği Asistanlarının Basınç Ülseri Hakkındaki Bilgi Düzeylerinin Değerlendirilmesi

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Abstract: This study aims to assess the knowledge levels regarding pressure ulcers among family medicine residents undergoing specialty training in Izmir. This study is a cross-sectional study. 216 family medicine residents who received specialization training at Izmir Katip Çelebi University (IKÇÜ), Dokuz Eylül University(DEU), Izmir Bozyaka Training and Research Hospital and Tepecik Training and Research Hospital were included in our study after giving their permission to participate. The participants were administered a sociodemographic data survey prepared by the researchers after reviewing the relevant literature and the 'Pressure Ulcer Prevention Knowledge Assessment Survey'. Data were evaluated using the SPSS 22 (Statistical Package for the Social Sciences) package program. The mean age of the participants was 30.12±5.81 years, the median number of years spent in the profession was 4 years, and the median time spent in residency (months) was 17 months. When evaluated statistically, the scores of the Knowledge Assessment Questionnaire on Pressure Ulcer Prevention (KAPQ) were found to be significantly higher in physicians who used a source for pressure ulcers (38.9%, n=81), received training on the diagnosis, treatment, and prevention of pressure ulcers (37.5%, n=81), worked in a home health unit during their residency (53.7%, n=116), encountered pressure ulcers frequently (25.9%, n=56), and used a scale for the assessment of pressure ulcers (31.5%, n=68). The aim of family medicine specialization training is to train physicians who can provide primary health care services through theoretical and practical training. Pressure ulcers are one of the most common diagnoses encountered during mandatory and elective clinical rotations. Our study shows that family medicine assistants' awareness and knowledge about pressure ulcer, which is a preventable health problem, are not at a sufficient level. In this context, necessary arrangements should be made in educational curricula and applied training programs.
Keywords: Family Medicine, Pressure ulcer, Wound

Özet: Bu çalışmanın amacı, İzmir'de uzmanlık eğitimi alan aile hekimliği asistanları arasında basınç ülseri hakkındaki bilgi düzeylerini değerlendirmektir. Bu çalışma kesitsel bir çalışmadır. İzmir Katip Çelebi Üniversitesi (IKÇÜ), Dokuz Eylül Üniversitesi (DEÜ), İzmir Bozyaka Eğitim ve Araştırma Hastanesi ve Tepecik Eğitim ve Araştırma Hastanesi'nde uzmanlık eğitimi alan 216 aile hekimliği asistanı, katılım izinleri alınarak çalışmamıza dahil edildi. Katılımcılara, ilgili literatür tarandıktan sonra araştırmacılar tarafından hazırlanan sosyodemografik veri anketi ve 'Basınç Ülseri Önleme Bilgi Değerlendirme Anketi' uygulandı. Veriler SPSS 22 (Sosyal Bilimler için İstatistik Paketi) paket programı kullanılarak değerlendirildi. Katılımcıların yaş ortalaması 30,12±5,81 yıl, meslekte geçirilen yıl ortancası 4 yıl, asistanlıkta geçirilen süre ortancası (ay) 17 ay olarak bulundu. İstatistiksel olarak değerlendirildiğinde, basınç ülseri için kaynak kullanan (38,9%, n=81), basınç ülserlerinin tanısı, tedavisi ve önlenmesi konusunda eğitim alan (37,5%, n=81), asistanlığı sırasında evde sağlık biriminde çalışan (53,7%, n=116), basınç ülserleriyle sık karşılaşan (25,9%, n=56) ve basınç ülserlerini değerlendirmek için ölçek kullanan (31,5%, n=68) hekimlerde Basınç Ülseri Önleme Bilgi Değerlendirme Anketi (KAPQ) puanları anlamlı derecede daha yüksek bulundu. Aile hekimliği uzmanlık eğitiminin amacı, teorik ve pratik eğitim yoluyla birincil sağlık hizmeti sunabilen hekimler yetiştirmektir. Basınçülseri, zorunlu ve elektif klinik rotasyonlar sırasında karşılaşılan en yaygın tanılardan biridir. Çalışmamız, aile hekimliği asistanlarının önlenebilir bir sağlık sorunu olan basınç ülseri konusunda farkındalık ve bilgilerinin yeterli düzeyde olmadığını göstermektedir. Bu bağlamda, eğitim müfredatlarında ve uygulamalı eğitim programlarında gerekli düzenlemeler yapılmalıdır.
Anahtar Kelimeler: Aile Hekimliği, Basınç Ülseri, Yara

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1. Introduction

Advances in medicine have led to remarkable successes in the diagnosis and treatment of diseases. However, the increase in life expectancy has led to the emergence of different health problems. The increase in the geriatric population, the restriction of mobility of individuals and the presence of various diseases that cause them to be bedridden have created a new and serious problem for healthcare professionals in the form of pressure sores (1). The aging of the population in the world and our country, the decrease in fertility, and the increase in life expectancy have resulted in the necessity of long-term care services. It is estimated that in the coming years, more people will be at risk due to chronic diseases and increasing care needs that accompany old age. By 2050, there will be 2 billion people over the age of 60, 80% of whom are expected to be in developing countries (2).

A pressure ulcer is damage to the skin and subcutaneous tissues in an area that remains ischemic under direct pressure and/or under the influence of mechanical friction forces (3). Pressure ulcers are frequently seen in elderly patients. This causes significant morbidity and mortality and leads to high costs in health services (4). In elderly patients, both age-related physiological changes and age-related comorbid diseases facilitate the formation of pressure ulcers (5). The incidence of pressure ulcers varies according to the patient group examined. The incidence of pressure ulcers is usually higher in patients in intensive care units, geriatrics, and neurology clinics (6).

According to the guidelines published in 2014 by the International Pressure Ulcer Advisory Panel (NPUAP), the prevalence in literature records examined between 2000 and 2012 was reported as 0%-46% in acute care units, 13.1%-45.5% in intensive care units, and 4.1%-72.5% in elderly care settings. According to the same reports, the incidence rate was 0%-12% in acute care units, 3.3%-53.4% in intensive care units, and 1.9%-59% in elderly care units (1).

Various studies have been conducted on this issue in our country. Hug et al. found the incidence of pressure ulcers to be 7.2%, Kurtuluş and Pınar found it to be 18.3% in neurology intensive care units, Karadağ and Gümüşkaya found it to be 54.8% in surgical unit patients, and Şenturan et al. found it to be 16.7% in intensive care unit patients (7-10). In a study conducted by Leblebici et al. for 1 year, the overall incidence of pressure ulcers was found to be 1.6% and the incidence in intensive care units was found to be 4.30% (11).

In a study conducted in our country, it was found that 70% of the patients with pressure ulcers were detected after passing stage 1; therefore, it was emphasized that preventive activities against pressure ulcer formation are of great importance (12). It is crucial that family physicians, as the first point of contact with the patient, carry out the necessary preventive health services to avoid the occurrence of pressure ulcers in risky patients.

The present study aims to evaluate the knowledge levels of family medicine residency students, who are continuing their specialty training in İzmir, regarding pressure ulcers.

2. Materials and Methods

Our cross-sectional study was conducted between July 1, 2023, and September 30, 2023, with family medicine residents studying at the Department of Family Medicine of İzmir Katip Çelebi University (IKCU) , the Department of Family Medicine of Izmir Health Sciences University Tepecik Training and Research Hospital, the Department of Family Medicine of Izmir Health Sciences University Bozyaka Training and Research Hospital, and the Department of Family Medicine of Dokuz Eylül University (DEU).

a. Population and Sample of the Study

Our study universe consisted of 430 resident physicians in the Family Medicine specialization training process in Izmir. Table 1 shows the universities where the participants received their education and the number of participants. Sample size was calculated using the Open Epi sample calculation tool. Taking 50 percent as the unknown frequency, the sample size was calculated as at least 204 people with a 95% confidence interval and a 5% margin of error. The participants were informed about the study. Informed consent was obtained from the participants who agreed to participate in the study. A total of 216 resident physicians participated in the study.

Method of Implementation of the Study and Collection of Data

The researcher applied a questionnaire form to the participants using a face-to-face interview technique. A 43-question sociodemographic data questionnaire

and the "Pressure Ulcer Prevention Knowledge Assessment Tool (PUPKAI)" prepared by the researchers in line with the relevant literature were applied to the participants (13,14). In the sociodemographic data scale, the questions related to age, gender, graduation year, units worked during general practice, duration of specialty training, experiences related to pressure ulcers, and evaluation of pressure ulcers were included. The Pressure Ulcer Prevention Knowledge Assessment Instrument includes 30 questions on the diagnosis, predisposing, and preventive factors and treatment of pressure ulcers.

b. Data Evaluation

The data obtained were analyzed using SPSS 22 (Statistical Package for the Social Sciences) package software. In the study, descriptive analyses were presented using mean, median, standard deviation, and minimum-maximum value for numerical variables, and number, frequency, and percentage for categorical variables. The conformity of the normal distribution of the data was tested with Kolmogorov Smirnov. the Chi-square and Mann-Whitney U tests were used in intergroup comparisons depending on the variable characteristics. Each correct answer of the participants to the questions related to pressure ulcers in the questionnaire was evaluated as 1 point and each incorrect answer was evaluated as 0 points. Thus, a score was obtained for each participant. The total score is 30 when each of the nonparametric questions is answered correctly. P values below 0.05 were considered statistically significant.

c. Ethical Consideration

In accordance with Non-Interventional Clinical Research Ethics Committee Directive, Ethics Committee approval was received with the decision number 0267 dated 15.06.2023.

3. Results

A total of 216 resident physicians receiving family medicine residency training in Izmir participated in the study. The mean age of the participants was 30.12±5.81 years (Median: 28.00, Min: 25.00, Max: 58.00). Data regarding the participants' gender, the institution they work at, and the unit they work in related to pressure ulcers are provided in Table 1.

Of the participants, 37.5% (n=81) had received training on pressure ulcer prevention, and 31.5% (n=68) used a scale to assess pressure ulcers. Of the participants, 38.9% (n=81) utilized a resource for pressure ulcer prevention. Among participants who used resources to prevent pressure ulcers, 96.3% (n=78) used the internet, 44.3% (n=36) used books, and 8.6% (n=7) used journals.

Among the participants, 25.9% (n=56) frequently, 38% (n=82) occasionally, 28.2% (n=61) rarely, and 7.9% (n=17) never encountered a patient with pressure ulcers. 11.6% (n=25) of the participants had a relative with pressure ulcers.

Table 1. Sociodemographic Data and General Information of Participants

	n	**%**
Gender		
Female	128	59.3
Male	88	40.7
General practice process*		
Emergency room	156	72.2
Home Health Services	28	13.0
112 unit	26	12.0
Family Medicine	44	20.4
Community Sealth Center	39	18.1
Other (Occupational medicine-palliative care)	10	4.6
Not employed	25	11.6
Working institution		
[1]IKCU	96	44.4
[2]DEU Faculty Of Medicine	48	22.2
University of Health Sciences Bozyaka Training and Research Hospital Faculty of Medicine	33	19.9
University of Health Sciences Tepecik Training and Research Hospital Faculty of Medicine	29	13.4

Working Status in Units Where Pressure Ulcers Are Common*		
Home Health Services		
Palliative care	116	53.7
Intensive care unit	88	40.7
Plastic surgery	18	8.3
	2	0.9

**Participants indicated more than one option.*
[1]IKCU: İzmir Katip Çelebi University, [2]DEU: Dokuz Eylül University

The participants' level of knowledge about the factors predisposing to pressure ulcers revealed that the question with the most correct answers was "Low albumin (<3) increases the risk of pressure ulcer formation" and the question with the least correct answers was "Moist skin reduces the risk of pressure ulcers" (Table 2).

Table 2. Frequency of Participants' Correct Knowledge of Factors Predisposing to Pressure Ulcers

	n	**%**
Moist skin reduces the risk of pressure ulcers.(F)	84	38.9
Hypertension increases the risk of pressure ulcers. (T)	173	80.1
A hypothermic patient is not considered at risk for pressure ulcers. (F)	195	90.2
Anemia (hb<12) increases the risk for pressure ulcer formation. (T)	200	92.6
Low albumin (<3) increases the risk of pressure ulcer formation. (T)	211	97.7

**T: True, F: False*

When examining the frequency of correct answers given by participants regarding the prevention and treatment of pressure ulcers, it was found that the most correctly answered question was "Highly absorbent incontinence products should be used for individuals with pressure ulcers or those at risk of pressure ulcers who have urinary incontinence." and the least correctly answered question was "Moisturizing cream is used to protect reddened skin." The frequency of correct knowledge of the participants regarding the prevention and treatment of pressure ulcers is presented in Table 3.

Table 3. Distribution of Participants' Correct Answers Regarding Pressure Ulcer Prevention and Treatment

	n	**%**
Moisturizing cream is used to protect reddened skin. (T)	43	19.9
Highly absorbent incontinence products should be used for individuals with pressure ulcers or those at risk of pressure ulcers who have urinary incontinence.(T)	198	91.7
The individual should be placed in a prone position frequently during the day. (F)	109	50.5

**T: True, F: False*

When examining the frequency of correct answers given by participants regarding the diagnosis of pressure ulcers, it was found that the most correctly answered question was "When classifying, the wound size/depth, wound edges, presence of odor/exudate, infection, tunneling, and pain indicators are evaluated." and the least correctly answered question was "The Bates-Jensen Wound Assessment Tool is one of the scales used for pressure ulcer risk assessment." (Table 4).

Table 4. Frequency of Participants' Correct Answers Regarding the Diagnosis of Pressure Ulcers

	n	%
When classifying, the wound size/depth, wound edges, presence of odor/exudate, infection, tunneling, and pain indicators are evaluated. (T)	215	99.5
The Braden Scale evaluates parameters such as sensory perception, moisture, activity, mobility, nutrition, and the effects of friction and shear.(T)	202	93.5
A Braden scale assessment score below 10 indicates an increased risk for pressure ulcer formation.(F)	77	35.6
The Bates-Jensen Wound Assessment Tool is one of the scales used for pressure ulcer risk assessment. (F)	22	10.2

A pressure ulcer originating from the operating room is defined as a pressure ulcer that develops within the first 24 hours after surgery. (F)	59	27.3
The presence of tunneling or bridging in the wound bed is a sign of infection. (F)	178	82.4
If a pressure ulcer reveals exposed bone, or the bone feels either hard or soft, or if the ulcer has not healed despite appropriate treatment, an evaluation for osteomyelitis should be conducted. (T)	209	96.8
The presence of adipose (fat) tissue, granulation tissue, fibrinous scar tissue (slough), and crusted dead skin (eschar) are the findings observed in stage 2 pressure ulcers. (F)	78	36.1
Full-thickness skin and tissue loss in ulcers with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage, or bone, epibole (rolled edges), undermining under wound edges, and/or tunneling are indications of stage 4 pressure ulcers.(T)	207	95.8

T: True, F: False

When examining the frequency of correct answers given by participants regarding the treatment of pressure ulcers, it was found that the most correctly answered question was "Heels at risk of pressure sores should be elevated using a splint or a pillow/foam cushion to distribute the weight of the leg along the calf without putting pressure on the Achilles tendon and popliteal vein." and the least correctly answered question was "Adults with malnutrition or at risk of malnutrition and with pressure ulcers should be provided with 0.6-0.9 grams of protein per kilogram per day." (Table 5).

Table 5: Frequency of Accurate Knowledge of the Participants Regarding the Treatment of Pressure Ulcers

	n	**%**
For uninfected Category/Stage III and IV pressure ulcers with minimal exudate, a hydrogel dressing can be used.(T)	166	76.9
For uninfected Category/Stage II pressure ulcers, hydrogel dressings can be used depending on the clinical condition of the pressure ulcer.(T)	205	94.9
Adults with pressure ulcers who are malnourished or at risk of malnutrition should be offered high-calorie, high-protein supplements in addition to their regular diet if their nutritional needs cannot be met by their regular diet. (T)	207	95.8
For individuals at risk of heel pressure ulcers, heels should be elevated with a device or a pillow/foam cushion that distributes the leg's weight along the calf, avoiding pressure on the Achilles tendon and popliteal vein. (T)	208	96.3
Skin at risk of pressure ulcers should be massaged and a warm compress applied. (F)	150	69.4
If the patient is in poor health, he/she is not moved (in bed).(F)	193	89.4
Antiseptics such as povidon iodine, H2O2, and chlorhexidine should be the first choice for pressure ulcer cleaning. (F)	75	34.7
Adults with malnutrition or at risk of malnutrition and with pressure ulcers should be provided with 50-55 kcal/kg/day of energy. (F)	30	13.9
Adults with malnutrition or at risk of malnutrition and with pressure ulcers should be provided with 0.6-0.9 grams of protein per kilogram per day. (F)	28	13
Adults with Category/Stage II or higher pressure ulcers and with malnutrition or at risk of malnutrition should be given high-calorie, high-protein, arginine, zinc, and antioxidant oral food supplements or enteral formula. (T)	198	91.7
To relieve or redistribute the pressure, the individual should be positioned using manual handling techniques and equipment that reduces friction and tearing. (T)	209	96.8
The head of the bed should be kept as upright as possible. (F)	113	52.3
Even in the absence of infection, stable, hard, dry, and crusted dead skin (eschar) on ischemic extremities and the heel should be removed.(F)	82	38.0

T: True, F: False

The participants had a mean correct response rate of 20.03±2.68 on the 'Pressure Ulcer Prevention Knowledge Assessment' (median: 20.00, range: 11.00–30.00). A statistically significant relationship was found between their scores and factors such as the use of resources for pressure ulcers, prior training on pressure ulcers, experience working in a home healthcare unit, frequent encounters with pressure ulcers, and the use of a scale for diagnosing pressure ulcers. (Table 6).

Table 6. Comparison of participants' knowledge levels and influencing factors

	Questionnaire score			
	Ortanca	**Min**	**Max**	**p**
Time spent in the profession				
Less than 4 years	20,00	11,00	26,00	0,359
More than 4 years	20,00	15,00	30,00	
Time spent as an assistant				
Less than 17years	20,00	11,00	27,00	0,668
More than 17 years	20,00	13,00	30,00	
Resource use status for pressure ulcers				
yes	21,00	13,00	30,00	**0,020**
no	19,00	11,00	30,00	
Pressure ulcer education status				
yes	21,00	15,00	30,00	**0,025**
no	19,00	11,00	30,00	
Working situation in units where pressure ulcers are common during the assistantship period				0,262
Yes	20,00	11,00	30,00	
no	20,00	13,00	25,00	
Working status in home health				
yes	20,00	13,00	30,00	**0,014**
no	19,00	11,00	30,00	
Frequent encounter with pressure ulcers				
yes	21,00	17,00	26,00	**0,042**
no	20,00	11,00	30,00	
Scale usage status				
yes	21,00	13,00	30,00	**0,011**
no	19,00	11,00	30,00	

4. Discussion

This study was conducted to evaluate the knowledge levels of family medicine residents receiving specialization training in Izmir province regarding pressure ulcers. 216 resident physicians in the Family Medicine specialization training process participated in the study.

In a study conducted by Ünal et al., 54.6% of the family physician residents who participated in the study were found to have inadequate knowledge (15). A study carried out in the USA in 2009 with resident physicians, the mean score was found to be 69%, which is at a low level (16). According to a study conducted with healthcare workers, including doctors, in Pakistan, it was found that the knowledge, attitudes, and behavior levels of healthcare workers regarding pressure ulcers were inadequate (17). In a study by Çetin et al, it was determined that the knowledge level of the majority of family physicians was at an adequate level according to the questionnaire results. This could be attributed to the fact that actively practicing family physicians are primarily responsible for patients with pressure ulcers (18). In our study, the mean correct response rate of the participants to the questionnaire "The Pressure Ulcer Prevention Knowledge Assessment" was 20.03±2.68 (median: 20.00, min: 11.00, max: 30.00).

In studies conducted by Beeckman et al., Simonetti et al., Tülek et al., and Usher et al. examining the effect of years in the profession on pressure ulcer knowledge levels, it was found that those with more years of experience had higher questionnaire scores. (19, 20,21,22). In a study conducted with 155 family physicians in the State of Minnesota in the USA, the level of pressure ulcer knowledge of physicians with 3 years or more in the profession was found to be statistically significantly higher (23).

In a study by Şenkul et al. involving family medicine residents, no significant correlation was identified between the length of professional experience and the questionnaire scores (24). Conversely, Ünal et al. found that residents with one year or less of professional experience had significantly lower levels of knowledge (15). The literature supports that the time spent in the profession is positively correlated with the level of knowledge. However, in our study, although the median number of years spent in the profession was 4 years, no significant relationship was found

between time spent in the profession and knowledge. This could be attributed to the inability of resident physicians to complete their mandatory and elective rotations appropriately due to the pandemic for a large part of their training period.

In studies conducted by Simonetti et al. and Usher et al., it was determined that nursing students with more years of study and a higher number of departments they have worked in had higher questionnarie scores (20, 22). In our study, the median duration (months) of residency was 17 months and no significant relationship was found between the duration of residency and the PUPKAI score. This could be due to the fact that the decisions regarding patients with pressure ulcers were taken together with the training supervisor, not on their own during the residency period. In addition, the fact that nurses are trained to provide care to patients may also be effective in this.

Regarding the level of knowledge about pressure ulcers and the use of resources about pressure ulcers, Şenkul et al. found that the questionnaire scores of those who used a resource for pressure ulcers were significantly higher (25). A study found that Şengül et al, it was observed that nurses who closely followed the progress related to pressure ulcers and benefited from a resource had higher questionnaire scores (26). Similarly, in our study, it was observed that participants who benefited from any source for pressure ulcers had higher scores in the PUPKAI, which was statistically significant.

In a study conducted by Usher et al., participants who attended a course on pressure ulcers had higher questionnaire scores (22). According to research Ünal et al., the questionnaire scores of residents who received pressure ulcer training were found to be statistically significantly higher (15). According to a study by Çetin et al., 76.3% of the participating family physicians stated that they did not receive pressure ulcer training (18). In addition, the level of knowledge of those who received training was found to be higher than those who did not receive training. In a study conducted in Pakistan in 2022 for a total of 350 healthcare workers, 150 of whom were physicians, the change in pressure ulcer knowledge, attitude, and behavior levels before and after the training was examined; a significant increase was observed in the level of knowledge after the training (17). In our study, 37.5% (n=81) of the participants had received training to prevent pressure ulcers. Consistent with the literature, a statistically significant higher PUPKAI score was found for participants who received training.

In a survey conducted in Riyadh in 2018 among doctors working in palliative care, oncology, and hematology services, the level of knowledge was found to be adequate (27). In a study by Ünal et al., the questionnaire score of family physicians who worked in palliative care was found to be statistically significantly higher (15). In a study conducted with intensive care physicians in the USA, the Pieper-Zulkowski Pressure Wound Knowledge Test was administered; the average score of the participants was 75%, which was considered to be at an adequate level (28). In another study conducted by Şenkul et al., it was observed that resident physicians who worked in palliative service and home health units provided a statistically significant high rate of correct answers to the questions related to preventive interventions (25). In this study, no statistical significance was found between the participants' PUPKAI scores and their experience of working in units frequently encountering pressure ulcers during their specialist training. However, the PUPKAI score of participants working in home health units was determined to be statistically significantly higher. We believe that this is the result of physician assistants being responsible for the identification of patients with pressure ulcers in the home health unit.

Sahar Dalvand et al. found that respondents who frequently encountered patients with pressure ulcers had higher questionnaire scores (29). According to a study Şenkul et al., the questionnaire scores of participants who frequently encountered patients with pressure ulcers were found to be higher (25). In a study conducted by Ünal et al., the questionnaire score of respondents who answered the question "How often do you encounter pressure ulcers?" as "Once a day" or "Once a week" was found to be statistically significantly higher (15). A study conducted with 155 family physicians in Minnesota State in the USA determined that the mean scores of knowledge, attitude, and behavior of the ones who had more frequent encounters with pressure ulcers were significantly higher (23). Consistent with the literature, PUPKAI scores of participants who frequently encountered pressure ulcers were found to be statistically significantly higher in our study.

The literature presents different scales (Sarcopenia scale, mini malnutrition test, Braden risk scale, Norton risk scale, etc.) used in pressure ulcer assessment. The use of an appropriate scale for the early detection of conditions that facilitate pressure ulcer formation may help to prevent ulcer formation. Using a scale to assess and prevent pressure ulcer risk is an essential factor in improving the quality of

patient care. In addition, it can provide a standard in patient care and ensure objective evaluation by healthcare professionals. In the study by Ünal et al., it was found that 81.6% of participants did not use a scale, and the questionnaire scores of those who used a scale were significantly higher compared to those who did not (15). According to a study Çetin et al., when family physicians were asked whether they used scales such as the Mini Nutritional Assessment and Sarcopenia Scale to evaluate patients, the majority responded that they would decide based on the patient's medical condition, and this finding was statistically significant (18). In our study, 31.5% (n=68) of participants used scales, and similar to the literature, participants who used a scale had statistically significantly higher PUPKAI scores.

5. Conclusion

With the aging population globally and in our country, long-term care services have become increasingly important. Pressure ulcers are frequently observed in geriatric patients and can lead to serious morbidity and mortality, as well as high costs in healthcare services. For family physicians, who are the first point of contact with patients, it is crucial that they receive appropriate training and possess adequate resources, which can be achieved through family medicine residency training, in order to manage the diagnosis, treatment, and rehabilitation of pressure ulcers effectively. The knowledge and skills that family medicine residents are expected to acquire regarding this topic should be thoroughly covered in both theoretical and practical training curricula. Our study is believed to raise awareness on this issue and contribute to improving approaches to pressure ulcer patients in primary care settings.

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The Impact of Anesthesia Type on Bleeding and Blood Transfusion Requirements in High-Risk Cesarean Sections

Yüksek Riskli Sezaryen Operasyonlarında Anestezi Tipinin Kanama ve Kan Transfüzyonu İhtiyacı Üzerine Etkisi

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Abstract: To evaluate the impact of the chosen anesthesia type on intraoperative and postoperative blood loss and blood transfusion requirements in cesarean sections for high-risk pregnancies. This retrospective cohort study included cesarean sections performed in high-risk pregnancies at Konya City Hospital between August 8, 2020 and December 31, 2024. Patients were divided into two groups: General anesthesia (GA) and Neuraxial anesthesia (NA). Preoperative and postoperative hemoglobin (Hb) and hematocrit (Hct) values were assessed, along with the administration of erythrocyte suspension (transfusion) for Hb <8 g/dL, length of hospital stay, and intensive care unit (ICU) admission. Statistical significance was set at $p<0.05$. Out of 14.450 cesarean sections performed during the study period, 125 cases diagnosed with high-risk pregnancy were retrospectively analyzed. Of these, 79 patients underwent surgery under GA and 46 under NA. While no differences were observed in preoperative Hb and Hct values between the groups, the GA group exhibited a significant decline in postoperative Hb (7.75±0.9 g/dL) and Hct (24.65±2.58%) ($p<0.001$). Blood transfusion was required in 82.6% of the GA group compared to 43% in the NA group ($p<0.001$). Additionally, the median hospital stay was 2 (2–3) days in the NA group versus 3 (3–4) days in the GA group, and ICU admission rates were 5.1% and 23.9%, respectively ($p=0.002$). In cesarean sections for high-risk pregnancies, patients receiving GA exhibited increased blood loss, higher transfusion requirements, and prolonged hospital stays compared to those receiving NA. These findings suggest that the choice of anesthesia significantly influences perioperative blood loss and transfusion needs.
Keywords: High-risk pregnancy, cesarean section, spinal anesthesia, general anesthesia, blood loss, transfusion.

Özet: Yüksek riskli gebeliklerde gerçekleştirilen sezaryen operasyonlarında tercih edilen anestezi tipinin intraoperatif ve postoperatif kanama ile kan transfüzyonu ihtiyacı üzerindeki etkisini değerlendirmeyi amaçlamaktadır. Bu retrospektif kohort çalışma Konya Şehir Hastanesinde 08 Ağustos 2020-31 Aralık 2024 tarihleri arasında yüksek riskli gebelerde gerçekleşen sezaryen operasyonlarını değerlendirme altına almıştır. Çalışmaya dahil edilen hastalar, Genel Anestezi (GA) Grubu ve Nöroaksiyel Anestezi (NA) Grubu olarak ikiye ayrılmıştır. Preoperatif ve postoperatif hemoglobin (Hb) ile hematokrit (Hct) değerleri, Hb <8 g/dL durumunda uygulanan eritrosit süspansiyonu (kan transfüzyonu), hastanede kalış süresi ve yoğun bakım ünitesi (YBÜ) ihtiyacı değerlendirilmiştir. İstatistiksel analizde $p<0.05$ anlamlı kabul edilmiştir. 08 Ağustos 2020 - 31 Aralık 2024 tarihleri arasında yapılan 14.450 sezaryen operasyonundan, yüksek riskli gebelik tanısı konulan 125 vaka retrospektif olarak incelenmiştir. Hastalar GA (n=79) veya NA (n=46) altında ameliyat geçirmiştir. Preoperatif Hb ve Hct değerlerinde gruplar arasında fark bulunmazken, postoperatif dönemde GA grubunda Hb (7.75±0.9 g/dL) ve Hct (%24.65±2.58) değerlerinde anlamlı düşüş saptandı ($p<0.001$). GA grubunda kan replasmanı ihtiyacı %82.6 iken, NA grubunda %43 olarak belirlendi ($p<0.001$). Ayrıca, NA hastalarında hastanede kalış süresi 2 (2–3) gün, GA'da ise 3 (3–4) gün; YBÜ yatış oranları sırasıyla %5.1 ve %23.9 olarak tespit edildi ($p=0.002$). Yüksek riskli gebeliklerde yapılan sezaryen operasyonlarında, GA uygulanan hastalarda NA'ya göre artan kan kaybı, daha yüksek transfüzyon ihtiyacı ve uzamış hastanede kalış süresi gözlenmiştir. Bu sonuçlar, anestezi seçiminin perioperatif kan kaybı ve transfüzyon gereksinimi üzerinde belirleyici etkisi olduğunu ortaya koymaktadır.
Anahtar Kelimeler: Yüksek riskli gebelik, sezaryen doğum, spinal anestezi, genel anestezi, kan kaybı, transfüzyon.

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1. Introduction

Cesarean section (CS) is one of the most commonly performed obstetric procedures worldwide and is associated with significant complications for both the mother and the fetus (1). Although modern medical advancements have rendered cesarean operations safer, this procedure still carries a higher risk of maternal mortality and morbidity compared to vaginal delivery (2, 3). High-risk pregnancies, in particular, increase the likelihood of complications during these operations, rendering cesarean sections more complex (4). High-risk pregnancies encompass various medical conditions, including preeclampsia, placenta previa, gestational diabetes, and multiple pregnancies (5). In these cases, severe complications such as postpartum hemorrhage are frequently observed, and obstetric bleeding remains one of the leading causes of maternal death (6). Although the widespread practice of hospital births and interventions like blood transfusions have reduced maternal mortality rates, obstetric hemorrhage continues to be a significant global public health issue (7, 8).

The type of anesthesia is a critical factor influencing blood loss and the need for blood transfusion during cesarean sections (9-11). Spinal anesthesia (SA) and general anesthesia (GA) are the most commonly used techniques, each with its own advantages and disadvantages (12). However, the literature still lacks sufficient research regarding which anesthesia method results in reduced bleeding and a lower need for blood transfusion in high-risk pregnancies. This study aims to comprehensively evaluate the impact of anesthesia type on blood loss and transfusion requirements during cesarean sections in high-risk pregnancies.

2. Materials and Methods

This retrospective study was conducted using patient data from cesarean sections performed for high-risk pregnancies at the Konya City Hospital operating rooms between August 5, 2020, and December 31, 2025. The data of the patients included in the study were accessed through our hospital's electronic patient information management system (HBYS).

This study was approved by the KTO Karatay University Ethics Committee on November 28, 2024 (Ethics Approval No: 2024/013) and was conducted in accordance with the Helsinki Declaration and relevant ethical guidelines.

2.1. Patient Selection

Inclusion criteria required the participants to be high-risk pregnancy cases undergoing cesarean delivery at Konya City Hospital within the last four years. High-risk pregnancies were defined as those complicated by conditions such as preeclampsia, eclampsia, and placental abnormalities (including placenta previa, placenta accreta, placenta increta, or placenta percreta), as well as gestational diabetes and multiple pregnancies. In addition, participants were required to be pregnant individuals aged 18 years or older, classified as ASA II–III, and to have undergone cesarean delivery under either general or neuraxial anesthesia with complete data records available and a hemoglobin level of 8 g/dL or higher. Exclusion criteria eliminated patients who delivered by methods other than cesarean section, cases with incomplete or erroneous data records, and patients with specific medical conditions—such as coagulopathies—that could independently increase the need for blood transfusion. Furthermore, patients referred from the emergency department to another center or those not monitored postoperatively, as well as patients who underwent platelet replacement therapy, were excluded from the study.

2.2. Measurements

Demographic and clinical data of patients meeting the inclusion criteria were extracted from patient records. These data included age, ASA classification, comorbidities, and the type of anesthesia administered.

To assess blood loss, preoperative and postoperative hemoglobin (Hb) and hematocrit (Hct) values were recorded (i.e., preoperative Hb, preoperative Hct, postoperative Hb, and postoperative Hct). In patients with hemoglobin levels below 8 g/dL, the administered erythrocyte suspension (ES) replacement was considered equivalent to a blood transfusion, and the number of ES units provided was documented.

Additionally, the total length of hospital stay (in days), the requirement for intensive care, and the number of days spent in the intensive care unit (ICU) were recorded.

2.3 . Statistical Methods

Data analysis for this study was performed using IBM SPSS Statistics 20.0 (IBM-SPSS Inc., Chicago, IL, USA). Continuous variables are presented as mean ± standard deviation or median (25th–75th percentile), depending on the distribution, while categorical variables are expressed as numbers and percentages.

Normality of the data distribution was assessed using the Kolmogorov-Smirnov test, skewness and kurtosis values (accepted within the range of –2 to +2), as well as histograms and Q-Q plots. For continuous variables, the Independent Samples T-Test was applied when parametric assumptions were met, and the Mann-Whitney U test was used when these assumptions were not met. Categorical variables were analyzed using the Chi-square test. A p-value of <0.05 was considered statistically significant.

3. Results

Over the four-year period, a total of 14.450 cesarean sections were performed at the hospital. Among these cases, 125 were defined as high-risk pregnancies and met the inclusion criteria for the study. Of the included patients, 46 underwent cesarean sections under GA while 79 underwent the procedure under NA (spinal or epidural).

When comparing the included patients based on demographic and clinical characteristics (age, ASA classification, and existing high-risk pregnancy conditions), no statistically significant differences were found between the two groups (p>0.05) (Table 1). The mean age of the 79 patients who received NA was 30±6 years, while that of the 46 patients who received GA was 31±6 years (p=0.303). In terms of ASA classification, 87.3% of patients in the NA group were classified as ASA II and 12.7% as ASA III, whereas in the GA group, the proportions were 73.9% and 26.1%, respectively (p=0.079). Furthermore, no significant differences were observed between the groups regarding additional comorbidities examined under the category of high-risk pregnancy conditions (i.e., multiple pregnancies, preeclampsia/eclampsia, diabetes, and placental anomalies) (p>0.05).

Table 1. Demographic and Clinical Characteristics of Patients by Anesthesia Type

Characteristic		NA Group (n=79)	GA Group (n= 46)	*p*
Age (years, mean ± SD)		30±6	31±6	0.303
ASA Classification, n (%)	2	69 (87.3%)	34 (73.9%)	0.079
	3	10 (12.7%)	12 (26.1%)	
High-risk pregnancy condition, n(%)	Multiple Pregnancies	26 (32.9%)	12 (26.1%)	0.070
	Preeclampsia/Eclampsia	34 (43%)	22 (47.8%)	
	Diabetes	10 (12.7%)	1 (2.2%)	
	Placental Anomalies	9 (11.4%)	11 (23.9%)	

NA: neuraxial anesthesia; GA: general anesthesia; continuous variables are expressed as mean ± SD, and categorical variables are presented as n (%).

Regarding preoperative Hb and Hct values, no significant differences were observed between the NA and GA groups (p=0.250 and p=0.700, respectively). However, postoperative Hb and Hct levels were significantly lower in the GA group (p<0.001 for both) (Table 2).

In terms of blood transfusion, 57% of the patients in the NA group did not receive any transfusion, whereas only 17.4% of the GA group avoided transfusion. Moreover, the requirement for two or more units of blood was significantly higher in the GA group (69.6% vs. 12.7%, p<0.001) (Table 2).

When comparing the total hospital length of stay, a two-day stay was most common in the NA group (55.7%), whereas a three-day stay was most frequent in the GA group (41.3%). Additionally, the rates of hospital stays lasting four days or longer were significantly higher in the GA group; specifically, the proportion of patients with a six-day stay was 1.3% in the NA group compared to 8.7% in the GA group (p<0.001) (Table 2).

Regarding ICU admission, 94.9% of patients in the NA group did not require ICU care, compared to 76.1% in the GA group (p=0.002). Consequently, ICU admission was necessary for 23.9% of the GA group, while only 5.1% of the NA group required it (p=0.002) (Table 2).

Table 2. Distribution of Primary and Secondary Outcomes by Groups

Variable		NA Group (n = 79)	GA Group (n = 46)	*p*
Preoperative Hb (g/dL)		10.54±1.42	10.86±1.63	0.250
Preoperative Hct (%)		33.46±3.86	33.75±4.17	0.700
Postoperative Hb (g/dL)		8.88±1.42	7.75±0.9	<0.001
Postoperative Hct (%)		28.17±4.03	24.65±2.58	<0.001
Blood Transfusion (Units)	0	45 (57%)	8 (17.4%)	<0.001
	1	24 (30.4%)	6 (13%)	
	2	9 (11.4%)	24 (52.2%)	
	3	1 (1.3%)	4 (8.7%)	
	4	0 (0%)	4 (8.7%)	
Total Hospital LOS (Days)	2	44 (55.7%)	10 (21.7%)	<0.001
	3	26 (32.9%)	19 (41.3%)	
	4	6 (7.6%)	9 (19.6%)	
	5	2 (2.5%)	4 (8.7%)	
	6	1 (1.3%)	4 (8.7%)	
Total Hospital LOS (Days)		2 (2-3)	3 (3-4)	<0.001
ICU LOS (Days)	0	75 (94.9%)	35 (76.1%)	0.002
	1	3 (3.8%)	6 (13%)	
	2	1 (1.3%)	3 (6.5%)	
	3	0 (0%)	2 (4.3%)	
ICU Admission	No	75 (94.9%)	35 (76.1%)	0.002
	Yes	4 (5.1%)	11 (23.9%)	

NA: neuraxial anesthesia; GA: general anesthesia; LOS: Length of Stay; Hb: hemoglobin; Hct: hematocrit; ICU: intensive care unit; variables are presented as mean ± SD, n(%) or median (25–75 percentiles).

4. Discussion

This study demonstrated that, in cesarean sections performed for high-risk pregnancies, NA is associated with less intraoperative and postoperative bleeding and a reduced need for blood transfusion compared to GA.

Both spinal and general anesthesia used for cesarean delivery have their respective advantages and disadvantages; neither technique can be considered ideal on its own (13, 14). It is well established that high-risk pregnancies are accompanied by an increased risk of surgical complications and hemorrhage (5). In this patient population, meticulous anesthetic management is crucial to minimize perioperative blood loss and, consequently, the need for transfusion. Notably, the negative impact of GA on uterine contractility, leading to increased blood loss, is a critical issue that warrants careful consideration in high-risk pregnancies (10, 15).

Several studies have reported that general anesthesia is associated with a higher risk of maternal blood loss compared to spinal anesthesia. Nonetheless, GA is frequently preferred in emergency settings due to its rapid administration (2). Najam et al. demonstrated that regional anesthesia (spinal or epidural) is superior to general anesthesia in reducing intraoperative blood loss and transfusion requirements (12). Similarly, Hong et al. observed more stable hemodynamic parameters and lower blood loss in patients who received epidural anesthesia (15), while Andrews et al. reported that inadequate uterine tone and hemodynamic fluctuations in patients receiving GA were linked to increased blood loss (9). Other studies have indicated that GA results in significant declines in postoperative hemoglobin (Hb) and hematocrit (Hct) values, which correspond to a greater need for transfusion due to increased blood loss. In our study, although preoperative blood parameters were similar between the NA and GA groups in high-risk pregnancies undergoing cesarean section, the GA group exhibited a significant decrease in postoperative Hb and Hct values and a higher requirement for blood transfusion. These findings, in line with several previous studies, suggest that NA may be more advantageous in high-risk pregnancies.

Studies have also shown that the choice of anesthetic technique in cesarean delivery can affect the length of hospital stay. Postoperative hospital stay is closely related to the amount of intraoperative and postoperative blood loss and may serve as an important determinant in anesthetic management. Havas et al. found that patients receiving spinal anesthesia had a quicker return of postoperative gastrointestinal function and a shorter hospital stay

(an average of 48 hours) compared to those receiving GA (an average of 52 hours) (16). Similarly, Oh et al. demonstrated that patients receiving general or epidural anesthesia experienced longer hospital stays than those receiving spinal or combined spinal-epidural anesthesia (17). Furthermore, Fassoulaki et al. reported that patients undergoing cesarean delivery with NA were discharged earlier compared to those who underwent GA (18). Consistent with these findings, our study revealed that the GA group had a longer total hospital length of stay, suggesting that increased bleeding and related complications may delay discharge. Moreover, GA has been shown to increase the rate of intensive care unit (ICU) admissions following cesarean section. Wiskott et al. reported that patients receiving GA required more blood products, which, in turn, increased the likelihood of ICU admission (19). In accordance with these data, our study found that patients receiving NA had lower ICU admission rates compared to those receiving GA, underscoring the potential role of NA in reducing the need for intensive care.

This study has several limitations. First, its retrospective design introduces the risk of data inaccuracies and incomplete records, which may limit the generalizability of the findings. Second, as a single-center study, the results may vary with clinical practices and patient profiles at different institutions; multicenter studies with larger and more diverse populations are needed to confirm these findings. Third, blood loss was estimated based on the difference between preoperative and postoperative hemoglobin levels; however, factors such as perioperative fluid replacement, urine output, and third-space losses may affect this estimation. Additional methods may be necessary to more precisely assess the actual blood loss. Fourth, potential confounding factors such as surgical technique, surgeon experience, and intraoperative hemodynamic changes were not fully controlled, and these variables may influence blood loss and transfusion requirements. Fifth, the decision for intraoperative transfusion was made by the surgeon or anesthesiologist based on the amount of bleeding and hemodynamic parameters. However, in some cases, postoperative evaluation revealed that transfusion was performed despite the patient's Hb level being >8 mg/dL, considering clinical stability as well. This suggests that individual variations in patient management may exist and that a standardized blood transfusion protocol was not applied. This situation presents a significant limitation that may have influenced our results. Finally, only the transfusion of packed red blood cells was evaluated, with other blood products such as platelets, fresh frozen plasma, or other components not included in the analysis. A broader evaluation of total transfusion needs would be beneficial in future studies.

In conclusion, this study demonstrates that the type of anesthesia used in high-risk cesarean deliveries significantly affects the need for intraoperative and postoperative blood transfusions. Patients receiving general anesthesia experienced greater blood loss, an increased need for transfusion, and prolonged hospital stays compared to those receiving neuraxial anesthesia. These findings suggest that anesthetic management may play an important role in controlling bleeding and reducing transfusion requirements. Future prospective, multicenter studies should further evaluate the effects of anesthesia type on bleeding management and maternal outcomes.

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Current Topic in Developing World: Are Early Adolescents Aware of Climate Change?

Gelişen Dünyada Güncel Sorun: Erken Ergenler İklim Değişikliğinin Farkında Mı?

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Abstract: Climate change is recognized by the World Economic Forum as one of the top ten global crises. Existing scales measure awareness in adults, but there is no scale specifically developed for early adolescents. To address this gap, the "Early Adolescent Climate Change Awareness Scale" (EACCAS) was developed. The study targeted individuals aged 10–14 in Edirne, Türkiye (N = 7133, 25 schools). A multi-stage stratified cluster sampling method was used to select (n=897, 6 schools). A 43-item pool was generated based on literature and educational materials, and content validity was evaluated by nine experts. Feedback from a pilot study involving 21 students was used to refine the items. Data collection proceeded after obtaining ethical approvals. Structural validity was assessed through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) on two equal subsamples, while convergent and discriminant validity were tested. Reliability was measured using Cronbach's alpha coefficient. Analyses were conducted using SPSS 22 and R Studio's "lavaan" and "semTools" packages. The final scale consisted of 15 items across three subdimensions—causes, consequences, and measures—explaining 65.53% of the total variance. The Cronbach's alpha value was 0.92, and model fit indices indicated a good fit (CMIN/DF = 2.176, RMSEA = 0.051, CFI = 0.968, TLI= 0.961, SRMR= 0.041). The scale, scored on a 5-point Likert system (1 = strongly disagree, 5 = strongly agree), provides a range of 15–75 points. Higher scores indicate greater awareness. This scale is recommended for application in diverse populations following cultural adaptations.
Keywords: Climate change, Awareness, Early adolescence, Scale development, Reliability and validity.

Özet: İklim değişikliği, Dünya Ekonomik Forumu tarafından küresel ölçekte en önemli on krizden biri olarak belirtilir. Mevcut ölçekler, yetişkinlerdeki farkındalığı ölçerken, erken adölesanlar için geliştirilmiş bir ölçek bulunmamaktadır. Bu eksikliği gidermek amacıyla, "Erken Adölesan İklim Değişikliği Farkındalık Ölçeği" (EAİDFÖ) geliştirilmiştir. Araştırma, Türkiye'nin Edirne ilinde 10-14 yaş arasındaki bireyleri hedeflemiş (N = 7133, 25 okul) ve çok aşamalı tabakalı küme örnekleme yöntemi ile 6 okuldan 897 katılımcı seçilmiştir. Literatür ve eğitim materyalleri doğrultusunda 43 maddelik bir havuz oluşturulmuş ve içerik geçerliliği 9 uzmanın görüşleriyle değerlendirilmiştir. 21 öğrenciyle yapılan pilot çalışma, maddelerin düzenlenmesine yönelik geri bildirim sağlamıştır. Veri toplama süreci, gerekli etik onaylar alındıktan sonra gerçekleştirilmiştir. Yapısal geçerlilik, Açımlayıcı Faktör Analizi (AFA) ve Doğrulayıcı Faktör Analizi (DFA) ile iki eşit ayı grup üzerinde değerlendirilmiş, ayrıca benzeşme ve ayrışma geçerliliği test edilmiştir. Güvenilirlik, Cronbach alfa katsayısı ile ölçülmüştür. Analizler, SPSS 22 ve R Studio'nun "lavaan" ve "semTools" paketleriyle yapılmıştır. Nihai ölçek, üç alt boyuttan (nedenler, sonuçlar, önlemler) oluşan 15 maddeden oluşmuş olup, toplam varyansın %65,53'ünü açıklamaktadır. Cronbach alfa değeri 0,92 olarak hesaplanmış ve model uyum indeksleri iyi düzeyde bulunmuştur (CMIN/DF = 2.176, RMSEA = 0.051, CFI = 0.968, TLI= 0.961, SRMR= 0.041). Beşli Likert ölçeği (1 = kesinlikle katılmıyorum, 5 = kesinlikle katılıyorum) ile puanlanan bu ölçek, 15 ile 75 arasında puan aralığı sağlar. Daha yüksek puanlar, daha yüksek farkındalık anlamına gelmektedir. Ölçeğin kültürel uyarlamalar sonrasında kullanılması önerilmektedir.
Anahtar Kelimeler: İklim değişikliği, farkındalık, erken ergenlik, ölçek geliştirme, güvenilirlik ve geçerlilik.

Ethics Committee Approval: The study was approved by Trakya University Noninterventional Clinical Research Ethical Committee (Decision no: 16/14 -2023/396, Date: 23/10/2023).

Informed Consent: A written permission was obtained from Edirne Provincial Directorate of National Education.Verbal and written consent was obtained from both the students and their families.

Authorship Contributions: Concept: DHY, ÜÇ, GE. Design: DHY, ACY, ÜÇ, GE. Data Collection or Processing: STS, MÇ, HU. Analysis or Interpretation: DHY, ACY, HU. Literature Search: DHY. Writing: DHY, STS, MÇ, ACY.

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1. Introduction

Climate change, a phenomenon occurring at regular intervals, has been substantially exacerbated by human activities, particularly since the beginning of the industrial revolution (1). While natural factors such as solar radiation and volcanic activities play a role in climate change, the utilization of fossil fuels, deforestation, and widespread industrialization surged notably during the industrial revolution. These escalating human activities have significantly elevated the levels of natural greenhouse gases, including methane, ozone, carbon monoxide, and carbon dioxide, released into the atmosphere (2). This increase in greenhouse gas emissions has led to global warming by destroying the Earth's natural greenhouse effect, which has maintained the balance of the planet and nurtured life historically (3). As a result, the Earth's surface temperature has risen by 1.1 degrees Celsius compared to the pre-industrial period (4). The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) stresses that the climate is altering as a result of human activities and that nineteen out of the twenty warmest years on record took place after the year 2001(5). The World Economic Forum's Global Risks Report 2023 emphasizes that six of the top 10 risks are related to environmental challenges resulting from global climate change, including biodiversity decline, as well as natural disasters and extreme weather events (6). Regarding the damages caused by climate change, it is estimated that climate change affects approximately 3.6 billion people by means of emergencies such as forest fires and floods. Between the years 2030 and 2050, 250,000 additional deaths per year are projected due various conditions such as malnutrition, malaria and heat stroke (7). From the Paris Agreement to the Kyoto Protocol, the main focus of international efforts to combat climate change has been on reducing carbon emissions (8). Combatting climate change requires not only government activities but also societal engagement. The issue of achieving intergenerational climate justice is actually coming to the forefront here. The concept of climate justice is not just a scientific or financial matter but also involves highlighting how people are disproportionately affected and addressing the resulting injustices in a fair manner (9). However, in the current scenario, as climate change-related issues (such as global warming of 1.5°C) persist, it is reported that a generation born in 2020 faces a 2 to 7 times higher risk of experiencing extreme weather events, particularly heatwaves, compared to an individual born in 1960 (10). In combating this disproportionate impact, it is important to raise awareness in society and mobilize every age group on the importance of the environment, environmental problems, and possible solutions (11).

Recently, a study conducted in Mexico assessing adolescents' risk perceptions indicated that while they are aware of issues such as air pollution, earthquakes, and fires, there is a mention of low awareness regarding climate impacts (12). However, global young climate activists have managed to create an agenda by drawing the world's attention with their actions. The awareness raised in Sheffield by a 21-year-old, questioning governments with 'What will you do to protect the future of your children and grandchildren?' (13), is actually aimed at spreading to all youth.

Children are more vulnerable to climate change due to their ongoing development and social factors and adolescence is characterized by many physical, psychosocial and intellectual changes affecting adolescents' feelings, decisions and the way they perceive the World (14, 15). Evaluating adolescents with more limited age group helps to understand how their thoughts and knowledge alter as they age and also according to World agenda. Therefore, framework for appropriate interventions can be determined according to their specific needs (16).

The World Health Organization (WHO) defines adolescence as a phase between the ages of 10 and 19, characterized by various pre-adulthood transitions. It consists of three stages and the early adolescence is defined as the period between the ages of 10 and 14, which is called the "middle school years" in Türkiye and covers the years from fifth grade to eighth grade (17). The early adolescence is a very important group about understanding and developing awareness about some critical subjects regarding Earth's future. These children will grow up and become in important administrative positions in future. So their consciousness about climae change is critical for future policy development. In Türkiye, although there are studies measuring knowledge, attitudes and awareness of climate change among university students and high school age groups, limited study has been conducted to assess the climate change awareness of individuals in early adolescence (18, 19). The aim of this study is to develop a valid and reliable scale that can be used to measure climate change awareness among in early adolescence.

2. Material and Methods

In this study, a methodological design was used for develop a scale. Developing a scale requires preliminary preparations and certain steps (20). In this study, we followed the steps that were recommended in the literature for scale development (21).

Theoretical framework and item development of the scale

Following the literature review, it was observed that there is a lack of a scale measuring climate change awareness, especially in the adolescent group (18, 19). Hence, a conceptual framework was first constructed and then potential sub-dimensions and items were identified. During the preparation of the items, it was ensured that each item was expressed in a clear way and that each item did not contain more than one statement (22). The items are designed to include various dimensions of climate change, including the causes, consequences and precautions. When creating the item pool, the content of science textbooks from 5th to 8th grades was taken into consideration, consistent with the literature on Climate Change Awareness Scale (18, 19, 23). Afterwards, a pool of 36 items was formed.

Following this, expert opinion was sought for view and content validity (24). We received 9 responses from 9 experts, 6 of whom were faculty members specialized in the field of Public Health and the remaining 3 had 10 years or more work experience in the Directorate of National Education. Based on the expert evaluation, some items were revised, some items were removed, and 7 new items were added, resulting in a scale consisting of 43 items in total. After the expert opinions were acquired, the final version of the questionnaire was formed by the researchers in accordance with the recommendations in the relevant literature (20). The preliminary scale (Table 1) was administered to a sample of early adolescents (n = 21) to assess item clarity and comprehensibility. Based on feedback, minor revisions were made to improve item wording and clarity.

Table 1. Climate change awareness preliminary scale for early adolescence.

	General Items
1.	I have heard of the concept of climate change.
2.	Climate refers to weather events observed over large regions and many years.
3.	Climate change is an environmental issue.
4.	Climate change negatively affects human health.
5.	Global warming does not have adverse effects on nature (plants, animals, other living beings).
	Causes
6.	Excessive population growth causes climate change.
7.	The destruction of forested areas is a cause of climate change.
8.	Climate refers to weather events observed over large regions and many years.
9.	Excessive and unplanned construction of buildings causes climate change.
10.	People buying more than they need (clothes, toys, shoes, etc.) leads to climate change.
11.	People traveling more than necessary causes climate change.
12.	People consuming more electricity than necessary (watching mobile phones or tablets, playing computer games, etc.) is a cause of climate change.
13.	Establishing industrial facilities and factories in unsuitable places is a cause of climate change.
14.	When people need transportation, using public transport instead of private vehicles positively contributes to climate change.
15.	Using solid fuels like coal and wood for heating in homes increases climate change.
16.	Climate change results from human activities.
17.	Air pollution leads to climate change.
18.	Emissions from home chimneys contribute to climate change.
19.	Emissions from factory chimneys contribute to climate change.
20.	Emissions from vehicle exhausts contribute to climate change
	Consequences
21.	Climate change does not lead to a decrease in species.
22.	I think severe weather events (extreme heat or cold) are related to climate change.
23.	I think extreme rainfall/floods are related to climate change.

24.	I think forest fires are related to climate change.
25.	I think water-related problems such as drought are associated with climate change.
26.	Glaciers melt due to climate change.
27.	Sea levels rise due to climate change.
28.	Climate change does not lead to a decrease in agricultural production.
29.	Climate change negatively affects children's health.
30.	Some health problems in humans are caused by climate change.
31.	Extreme weather events (extreme heat or cold) in a place can cause people to migrate
	Precautions
32.	All countries should take joint measures against climate change.
33.	Each country should take measures suitable for its conditions against climate change.
34.	Measures encouraging recycling should be taken for climate change.
35.	Forested areas should be increased to combat climate change.
36.	Energy needs should be met from sources like solar and wind energy.
37.	Filters should be installed in factory chimneys for polluting gases causing air pollution.
38.	Proper waste disposal is crucial to combat climate change.
39.	Water consumption should be avoided in waste.
40.	Energy saving should be practiced to combat climate change.
41.	The excessive and unnecessary use of plastics should be reduced in the fight against climate change.
42.	Students should be educated about climate change in schools.
43.	The public should be educated about climate change.

** The responses were collected using a 5-point Likert scale (Strongly Agree | Agree | Unsure | Disagree | Strongly Disagree).*

2.2.Research population and sample size

The population of the study consisted of early adolescent middle school students studying in a city center in Türkiye. The recommended sample size in scale development studies is at least 5 and ideally 20 participants per item (21). In this study, a scale consisting of 43 items was developed, and a minimum sample size of 43*5=215 and a maximum sample size of 43*20=860 was obtained. The sample was selected from schools in different socioeconomic regions using a multi-stage stratified cluster sampling method. Stratification was based on class and socioeconomic region. The distribution of the research population and sample is presented in Figure 1. Research data were collected from January 1st, 2024 to February 29th, 2024. The research inclusion criteria are attending 5th, 6th, 7th, or 8th grade, knowing how to read and write in Turkish, and consenting to participate in the study. A total of 897 participants were included in the study. The entire population was randomly stratified according to the socioeconomic region of the school, grade level and gender, and two separate sample groups were formed. The representation of both groups is provided in Figure 1. While the model created for the first sample group was included in the EFA analysis, it was further tested using CFA on the second sample group. No statistically significant difference was found between the two sample groups in terms of socioeconomic region, grade level and gender.

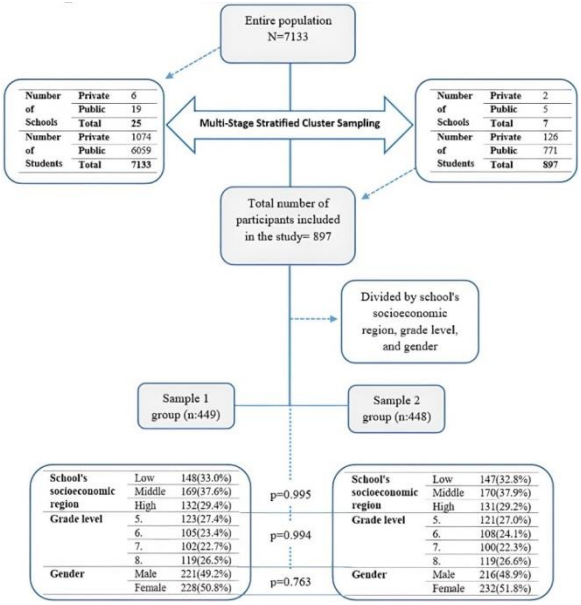

Figure 1. Distribution and comperative analysis of the divided sample groups.

2.3.Procedure

Trakya University Faculty of Medicine Research Ethics Approval for Non-Interventional Studies was obtained from the Scientific Research Ethics Committee on 23/10/2023 with reference number TÜTF-GOBAEK 2023/396. Permissions from the Governorship and the Directorate of National Education were obtained on 24/11/2023 with the reference number 90277863. Informed parental consent was also obtained for the students participating in the study. After obtaining the necessary permissions and approvals, data were collected from seven middle schools with the highest student population in the central district of Edirne. Data were collected through personal questionnaires distributed in the schools. Meetings were held with the administrators and teachers of the schools selected for data collection. Parental consents were sent to the families through their children. One week after the parental consents were obtained, the questionnaires were handed out face-to-face at the schools to the individuals who agreed to participate in the study. The average time to complete the questionnaires was 15 minutes.

Statistical analysis

While developing a scale, Exploratory Factor Analysis (EFA) should be preferred over Confirmatory Factor Analysis (CFA) due to the possibility of researchers making assumptions about the identified sub-dimensions (25). Moreover, CFA should be evaluated using a separate sample (21). Therefore, in this study, EFA was applied to half of the sample and CFA was applied to the other half of the sample to assess construct validity. Campbell and Fiske (26) proposed two ways to examine the construct validity of a test: convergent validity and discriminant validity. Reliability was also evaluated by using Cronbach's alpha.

Exploratory factor analysis (EFA): EFA was applied to the Group 1 sample. In this study, the principal components method was chosen for inference in EFA. Both scree test and parallel analysis were applied to determine the number of factors. For the rotation part, the oblique rotation method, especially the promax method, was used. In many studies, the orthogonal rotation method Varimax is used, where factors are analyzed when they are not correlated. However, in social sciences, especially when assessing behaviors and attitudes, factors are often correlated (20, 21). SPSS version 22 was used to conduct the EFA.

Confirmatory factor analysis (CFA): The model obtained via EFA was further analyzed by using group 2 sample through CFA. Model fit indices were evaluated using RMSEA (Root Mean Error of Approximation), CMIN/DF (Chi-Square/Degrees of freedom), CFI (Comperative Fit Index), TLI (Tucker Lewis Fit Index) and SRMR (Standard Root Mean Square Residuals). CFA was carried out using the "lavaan" package in R Studio (Vers.

2023.12.1+402). The "SemPlot" package was used for creating the graphics (27).

Convergent and discriminant validity: AVE (Average variance extracted) and CR (Composite Reliability) for convergent validity; Fornel-Larcker Test and HTMT (Heterotrait-Monotrait ratio of correlations) for discriminant validity were calculated using "lavaan" and "semTools" packages in R studio (27, 28).

3. Results

Exploratory Factor Analysis (EFA) was performed to determine the construct validity and factor structure of the Early Adolescent Climate Change Awareness Scale (EACCAS). The principal components method and oblique rotation (Promax) were used to perform EFA analysis. Defective items in the correlation matrix and items with low communality that contributed minimally to the total variance were identified and extracted one by one. As a result, 28 items were removed from the initial set of 43 items and a scale consisting of 15 items was formed after the EFA process.

Initially, Kaiser-Meyer-Olkin (KMO) Sampling Adequacy Measure was conducted and the result was calculated as 0.93, which indicates that the sample size provided excellent suitability for EFA. According to Field , a KMO value above 0.50 is accepted as adequate, whereas values between 0.9 and 1.0 are classified as excellent (29)]. Furthermore, Bartlett's test yielded a significant result of $X2=3680.54$; $p<0.05$, which indicates that there are strong correlations among the items selected for EFA.

EFA demonstrated that the 15-item EACCAS had a three-dimensional structure and that these three factors explained 65.54% of the total variance. Thus, it was concluded that EACCAC possesses valid qualifications. The first dimension accounted for 48.54% of the variance, the second dimension for 9.03%, and the third dimension for 7.97%. Table 2 and Figure 2 display the distribution of items in terms of factors and their factor loadings.

Table 2. Early adolescent climate change awareness scale EFA results.

Component Factors	Items	Factor 1	Component Factor 2	Factor 3
Factor 1	I34	0.528		
(Precautions)	I35	0.731		
	I37	0.824		
	I38	0.615		
	I39	0.853		
	I40	0.855		
	I41	0.706		
	I42	0.824		
Factor 2	I17		0.800	
(Causes)	I18		0.912	
	I19		0.913	
	I20		0.799	
Factor 3	I22			0.893
(Consequences)	I23			0.846
	I25			0.724
Eigenvalues		7.281	1.354	1.195
% of Variance		48.543	9.028	7.969
% Cumulative		48.543	57.571	**65.539**

KMO = 0.928, Significance of Barlett's test <0.001

As presented in Table 2 and Figure 2, the first dimension is composed of 8 items, the second dimension is composed of 4 items and the third dimension is composed of 3 items. Factor loadings of 0.30 and above were accepted to be ideal and indicated that the items made significant contributions to the factors. Moreover, the factors were titled as precautions, causes and consequences, respectively.

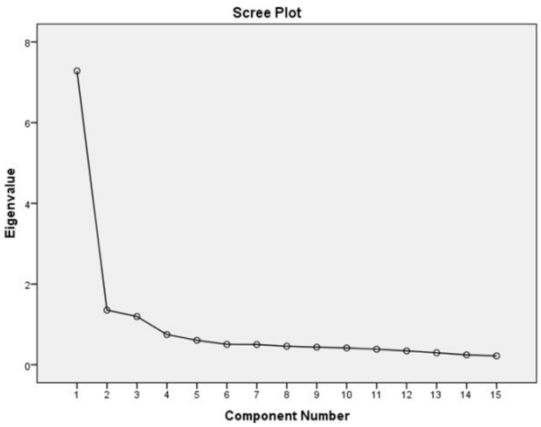

Figure 2. Scree plot of the EFA analysis.

The first step in testing structural validity was to conduct a CFA analysis on the model formed with EFA using the second group sample.

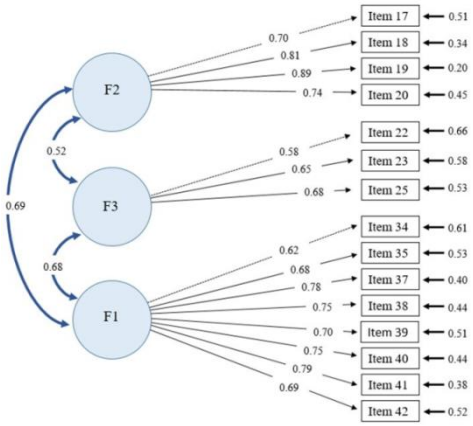

Figure 3. CFA path diagram.

CFA results such as path diagram and goodnes of fit measures are represented in Figure 3 and Table 3.

Table 3. CFA model fit indices.

Measure	Threshold	Model fit indices
CMIN	-	189.324
CMIN/df	<3 good; <5 sometimes permissible	2.176
CFI	≥0.95 great; >0.90 traditional	0.968
TLI	≥0.90	0.961
SRMR	<0.09	0.041
RMSEA	<0.05 good; 0.50-0.10 moderate; >0.10 bad	0.051
PClose	<0.05	<0.001

CMIN: Chi-Square; df: Degrees of freedom; CFI: comperative fit index; TLI: Tucker Lewis fit index; SRMR: Standart root mean square residual; RMSEA: root mean square error of approximation; PClose: p-value for testing the null hypothesisof the close fit.

When the path diagram of the CFA is analyzed, the single-headed arrows directed from the factors to the variables (items) examined indicate a one-way linear relationship. These variables present indication about how well each item represents its latent variable. According to the calculated model fit indices, good fit was observed for all other indices. For determining the convergent validity of the variables, CR and AVE (Average Variance Extracted) values were calculated and shown in Table 4.

Table 4. Convergent and discriminant validity values.

Convergent Validity			**Discriminant validity Fornel-Larcker Test**		
CR	**AVE**				
			Factor 1	Factor 2	Factor 3
0.870	0.626	Factor 1	**0.791**		
0.666	0.505	Factor 2	0.273	**0.711**	
0.896	0.518	Factor 3	0.471	0.457	**0.719**
				HTMT	
		Factor 1			
		Factor 2	0.528		
		Factor 3	0.696	0.667	

CR: Composite reliability; AVE: Average variance extracted; HTMT: Heterotrait-Monotrait ratio of correlations. The HTMT ratio values in the provided table reveal the correlations among the constructs of the model, with a HTMT value below 0.90 indicating discriminant validity. For Fornel-Larcker test table diagonal elements (bolded) are the square root of average variance extracted (AVE). Off-diagonal elementes are the correlations among factors.

According to (30)] factor loadings and AVE values above 0.50 and CR values up to 0.70 indicate that the research model has reached convergent validity (31). Despite the fact that the CR value calculated for Factor 2 in our model is below the threshold value, it is seen that convergent validity is deemed acceptable when other CR and AVE values are evaluated together. Discriminant validity analysis was performed using Fornel-Larcker and HTMT analysis. According to Fornel-Larcker test, the correlation between a construct and any other construct must be smaller than the square root of the average variance retrieved by the construct. The threshold value for HTMT analysis is 0.90 (32). It was found that the proposed model meets the discriminant validity criteria via both Fornel-Larcker test and HTMT analysis. Cronbach's alpha was used for internal reliability, and the calculated value for the total scale was found to be 0.917. As a result of EFA and CFA analysis, the 3-factor, 15-item substructure is stated in the Table 5.

Table 5. Early adolescent climate change awareness scale

			Strongly Disagree	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**
F2:Causes	17	Air pollution leads to climate change.	1	2	3	4	5
	18	Emissions from home chimneys contribute to climate change.	1	2	3	4	5
	19	Emissions from industrial chimneys contribute to climate change	1	2	3	4	5
	20	Emissions from vehicle exhausts contribute to climate change.	1	2	3	4	5
F3:Consequences	22	I think severe weather events (extreme heat or cold) are related to climate change.	1	2	3	4	5
	23	I think extreme rainfall/floods are related to climate change.	1	2	3	4	5
	25	I think water-related problems such as drought are associated with climate change.	1	2	3	4	5

F1: Precautions	34	Measures encouraging recycling should be taken for climate change.	1	2	3	4	5
	35	Forested areas should be increased to combat climate change.	1	2	3	4	5
	37	Filters should be installed in factory chimneys for polluting gases causing air pollution.	1	2	3	4	5
	38	Proper waste disposal is crucial to combat climate change.	1	2	3	4	5
	39	Water consumption should be avoided in waste.	1	2	3	4	5
	40	Energy saving should be practiced to combat climate change.	1	2	3	4	5
	41	Excessive and unnecessary plastic usage should be reduced to combat climate change.	1	2	3	4	5
	42	Schools should educate students about climate change.	1	2	3	4	5

Descriptive statistics for the items for both sample groups and the total population are presented in Table 6.

Table 6. Descriptive statisitcs of items for both sample groups

	Item Number	**Mean±SD**		
		Group 1	**Group 2**	**Total**
F2: Causes	I-17	4.13±1.05	4.16±1.05	4.14±1.05
	I-18	3.97±1.08	4.04±1.05	4.01±1.07
	I-19	4.12±1.08	4.13±1.10	4.13±1.09
	I-20	4.14±1.02	4.15±1.06	4.15±1.04
F3: Consequences	I-22	3.90±1.05	3.88±1.15	3.89±1.10
	I-23	3.70±1.16	3.79±1.14	3.75±1.15
	I-25	3.90±1.12	4.06±1.07	3.98±1.10
F1: Precautions	I-34	3.96±1.10	3.95±1.12	3.96±1.11
	I-35	4.05±1.13	4.07±1.11	4.06±1.12
	I-37	4.37±1.02	4.35±1.06	4.36±1.04
	I-38	4.07±1.07	4.11±1.08	4.09±1.08
	I-39	4.34±1.01	4.26±1.13	4.30±1.07
	I-40	4.13±1.08	4.15±1.09	4.14±1.08
	I-41	4.18±1.05	4.21±1.04	4.19±1.04
	I-42	4.21±1.08	4.18±1.13	4.19±1.10
Scale Total	**Factor 1**	33.31±6.53	33.27±6.64	33.29±6.59
	Factor 2	16.36±3.64	16.48±3.59	16.42±3.62
	Factor 3	11.50±2.77	11.73±2.62	11.62±2.70
	Total	61.17±11.16	61.49±10.91	61.33±11.03

The distribution and difference analyses of sub-dimension (factor) and total scale scores by gender, school's socioeconomic region, and grade variables for the entire population are presented in Table 7.

Table 7. Comparing scale scores according to various variables.

		Mean scale points							
		Factor 1	**p**	**Factor 2**	**p**	**Factor 3**	**p**	**Total**	**p**
School's SER*	**Low**	30.82±6.95	**0.001**	15.54±3.98	**0.001**	12.01±2.88	**0.001**	57.46±11.57	**0.001**
	Middle	34.38±5.34		16.87±3.06		11.76±2.49		63.01±9.11	
	High	34.65±6.86		16.84±3.67		11.10±2.68		63.50±11.56	
Grade level	**5.**	32.45±6.65	**0.005**	16.26±3.48	0.076	11.47±2.61	0.435	60.18±10.77	**0.011**
	6.	33.35±6.77		16.25±3.95		11.63±2.55		61.23±11.34	
	7.	32.81±7.35		16.18±3.92		11.51±3.01		60.50±12.86	
	8.	34.47±5.46		16.95±3.13		11.84±2.63		63.50±12.86	
Gender	**Male**	32.78±7.23	**0.025**	16.32±3.87	0.314	11.33±2.90	**0.002**	60.43±12.06	**0.015**
	Female	33.78±5.81		16.56±3.30		11.89±2.41		62.23±9.71	

**SER: Socioeconomic Region.*

There were statistically significant differences observed between groups based on the socioeconomic regions of schools in terms of both factor mean scores and total scale scores. According to the post hoc pairwise analyses, the mean scores for factor 1, 2, 3, and the total score in the group with low socioeconomic region (SER) were found to be significantly lower compared to the groups with medium and high SER. Regarding the students' grade levels, statistically significant differences were found between groups in terms of factor 1 and total scale mean scores. Pairwise group comparisons revealed that the mean score for factor 1 of 8th-grade students was significantly higher than that of 5th and 7th-grade students (p=0.004 and p=0.041, respectively). Additionally, the total scale mean score of 8th-grade students was significantly higher than that of 5th-grade students (p=0.004). When evaluated by gender, the mean scores for factor 1, factor 3, and the total scale were significantly higher in females compared to males.

4. Discussion

The aim of this study was to develop a valid and reliable scale to evaluate climate change awareness among early adolescents. Based on our findings, the Early Adolescence Climate Change Awareness Scale emerged as a robust measurement tool for this age group. Construct validity analyses identified 15 items across three sub-dimensions: causes, precautions and consequences. Confirmatory Factor Analysis conducted on a separate sample confirmed the scale's adequancy (CMIN/DF: 2.17, RMSEA: 0.051, SRMR: 0.041, CFI: 0.968, TLI: 0.961). Scores on the 5-point Likert scale ranged from 15 to 75, with higher scores indicating grater awareness. A cut-off score was not computed since there is no reference that measures awareness for this age group in the literature.

In Türkiye, climate change topics are introduced in early adolescence science classes, yet there was previously no valid tool to assess understanding. The causes sub-dimension highlighted concepts like air pollution, while consequences focused on issues such as glacier melting and extreme weather. Precautions emphasized recycling, forest conservation, and education programs, but omitted factors like population growth or biodiversity loss, which are noted in international studies. Contrary to our findings, international research suggests young people feel governments are insufficiently addressing climate issues (33). Studies with younger age groups frequently cite air pollution as a primary climate concern (34), similar to our findings. Additionally, in the literature, this age group suggests afforestations efforts in the fight against global warming (35) and has recommendations for addressing transportation related pollutants (36). When devoloping scale items, provisions related to legistlation or legal regulations (such as the Kyoto Protocol and the Paris Agreement) were not included, as they might be beyond the knowledge level of the relevant age group.

This scale is the unique instrument to measure climate change awareness in early adolescent age groups. There are other studies conducted in Türkiye that measure climate change awareness in other age groups. One of the studies conducted in Türkiye in 2020 developed a 21-item scale with four subscales

to determine the climate change awareness among university students. The four subscales were classified as causes, impacts on the natural and human environment, energy consumption, and organizations and agreements (19). Similarly, in a study conducted with high school students in Türkiye in 2023, a 17-item, 2 subdimension climate change awareness scale was developed and the subdimensions were defined as reasons for climate change and act to climate change (18). Furthermore, studies investigating climate change awareness among youth and adolescents in the literature highlight the concerns about climate in this population by addressing them as young and vulnerable groups (37, 38). It is crucial to assess the awareness of young individuals on climate change, to provide appropriate information on the issue, and to raise the young population as environmentally conscious individuals. Detecting the awareness of the young population regarding climate change can also contribute to managing their concerns about this issue. A program aimed at rising climate change awareness was implemented for individuals aged 10-12 in the United States. Before the program, many children reported that they had not heard of the concept of climate change. By the end of the program, their awareness had increased, emphasizing the importance of education on climate change (39). Although most studies in the literature that assess climate change awareness focus on the adult age group, the literature on the awareness of young people and adolescents is more limited. One striking example is when Greta Thunberg, who was just 15 years old in 2018, started the climate change movement known as 'School Strike for Climate', which rapidly grew (40). The increasing concerns and resistance of young people regarding climate change and the future challenges they will face (41) can also influence governments and decision-makers. According to a recent comrehensive review, 51 international studies were examined, and it was found that research assessing young people's climate change awareness typically focuses on topics such as beliefs, concerns, causes, consequences, and measures related to the issue (42).

In this study, the climate change awareness scale scores were compared in terms of various sociodemographic characteristics. According to the research findings, schools in higher grade levels, female gender, and regions with high socioeconomic status had significantly higher scale scores. Literature on the effect of age on environmental behaviors presents mixed results. Some research findings suggest that older age is associated with more environmental behaviors (43); while other studies indicate that younger participants exhibit more environmental behaviors (44, 45). In this study, it was observed that the climate change awareness scale score increased with age, which might be due to the formal education received with increasing age.

Regarding the limitations of the study, it is accepted that the answers given by the participants in the questionnaires are accurate and representative of reality. Despite that, the strengths of the study include the choice of cluster sampling, which is a probability sampling method, and the inclusion of representation of schools with different socioeconomic status. Furthermore, the evaluation of CFA and discriminant validity analyses using the R program and the use of sound statistical methods constitute another strength of the study.

5. Conclusion

In conclusion, the items of the Early Adolescence Climate Change Awareness Scale devoleped in the present study are consistent with the topics indicated in the literature on climate change awareness studies for young age groups. Raising the younger generation as environmentally conscious individuals can support the future architects of green transformation technologies and developments. The initial pool of 43 items was reduced to 15 items after the CFA analysis. This is an expected outcome. It is necessary to prepare three to four times the number of items initially planned for the scale, if possible. Having a larger number of items increases the opportunity to select those that offer the desired level of comprehensiveness and discriminative power (46). As a result of the current research, a valid and reliable scale that addresses the awarenesses of early adolescents about climate change in three sub-dimensions (causes, consequences, and precautions), fifteen items has been developed. It is recommended that the current scale be used after different culturel adaptation studies.

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Evaluating Inflammatory Markers in Sudden Sensorineural Hearing Loss: The Neutrophil-To-Lymphocyte Ratio, The Systemic Immune Inflammation Index, and The Pan Immune Inflammation Value as Prognostic Tools

Ani Sensörinöral İşitme Kaybında İnflamatuar Belirteçlerin Değerlendirilmesi: Nötrofil-Lenfosit Oranı, Sistemik İmmün İnflamasyon İndeksi ve Pan İmmün İnflamasyon Değerinin Prognostik Rolü

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Abstract: This research sought to explore the association between sudden sensorineural hearing loss and inflammation by analyzing key inflammatory indicators, such as the neutrophil-to-lymphocyte ratio, the systemic immune inflammation index , and the pan-immune-inflammation value .This retrospective study was conducted at a tertiary medical center's otolaryngology department between 2016 and 2021, involving sudden sensorineural hearing loss patients diagnosed and treated during the specified period. Two hundred sudden sensorineural hearing loss patients and 200 healthy controls were included. Inflammatory markers were calculated from complete blood count data. Audiological evaluations categorized patients based on hearing loss severity. Patients with sudden sensorineural hearing loss demonstrated significantly elevated levels of inflammatory markers compared to the control group: NLR: 3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$; SII: 953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$; and PIV: 523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$. ROC analysis revealed superior diagnostic performance for the systemic immune inflammation index, and the pan-immune-inflammation value, with AUC values of 0.693 and 0.648, respectively, compared to NLR (AUC = 0.692). This study provides novel insights into the relationship between inflammation and sudden sensorineural hearing loss. Elevated neutrophil-to-lymphocyte ratio, the systemic immune inflammation index, and the pan-immune-inflammation value levels in sudden sensorineural hearing loss patients suggest their potential as valuable indicators for understanding the etiology and predicting outcomes of sudden sensorineural hearing loss . The study underscores the need for further research to validate these findings and explore the underlying mechanisms connecting inflammation to sudden sensorineural hearing loss.
Keywords: Sudden sensorineural hearing loss, Inflammatory markers, SII, PIV, Hearing assessments

Özet: Bu araştırma, nötrofil lenfosit oranını , sistemik immün-inflamasyon indeksi ve panimmun inflamasyon değeri gibi temel enflamatuar göstergeleri analiz ederek ani işitme kaybı ve enflamasyon arasındaki ilişkiyi araştırmayı amaçlamıştır.Bu retrospektif çalışma, 2016-2021 yılları arasında üçüncü basamak bir tıp merkezinin kulak burun boğaz bölümünde, belirtilen dönemde tanı konulan ve tedavi edilen ani işitme kaybı hastalarını içerecek şekilde yürütülmüştür. 200 ani işitme kaybı tanılı hasta ve 200 sağlıklı kontrol dahil edilmiştir. Enflamatuvar belirteçler tam kan sayımı verilerinden hesaplanmıştır. Odyolojik değerlendirmeler hastaları işitme kaybı şiddetine göre kategorize edilmiştir. Ani işitme kaybı hastalar kontrol grubuna kıyasla anlamlı derecede yüksek enflamatuar belirteç seviyeleri göstermiştir: NLR: 3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$; SII: 953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$; ve PIV: 523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$. ROC analizi, NLR (AUC = 0,692) ile karşılaştırıldığında sırasıyla 0,693 ve 0,648 AUC değerleri ile sistemik immün-inflamasyon indeksi ve panimmun inflamasyon değeri için üstün tanısal performans ortaya koymuştur.Bu çalışma enflamasyon ve ani işitme kaybı arasındaki ilişkiye dair yeni bilgiler sunmaktadır. Ani işitme kaybı hastalarında yüksek nötrofil lenfosit oranını sistemik immün-inflamasyon indeksi ve panimmun inflamasyon değeri düzeyleri, ani işitme kaybının etiyolojisini anlamak ve sonuçlarını öngörmek için değerli göstergeler olarak potansiyellerini göstermektedir. Çalışma, bu bulguları doğrulamak ve enflamasyonu ani işitme kaybına bağlayan altta yatan mekanizmaları keşfetmek için daha fazla araştırma yapılması gerektiğinin altını çizmektedir.
Anahtar Kelimeler: Ani sensörinöral işitme kaybı, Enflamatuar belirteçler, SII, PIV, İşitme değerlendirmeleri

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1. Introduction

Sudden sensorineural hearing loss (SSNHL) is characterized by a rapid onset of hearing loss greater than 30 dB across at least three consecutive audiometric frequencies within 72 hours. This condition, which typically occurs in one ear, remains a significant clinical challenge due to its often-unknown etiology and unpredictable prognosis [1,2].

SSNHL prognosis varies, with one-third of patients fully recovering, another third partially improving, and the rest showing little to no recovery. Outcomes are influenced by factors such as initial hearing loss severity, vertigo, treatment timing, unaffected ear condition, and audiogram patterns [3]. These variables underscore the complexity of SSNHL and the challenges in predicting patient outcomes.

The exact cause of SSNHL is often unclear, with fewer than 30% of patients receiving a definitive diagnosis. The annual incidence ranges from 5 to 27 cases per 100,000 individuals, with approximately 66,000 new cases annually in the U.S. Despite its prevalence, over 70% of cases remain idiopathic. Proposed mechanisms include viral or bacterial infections, vascular compromise, cochlear cellular stress, and autoimmune disorders. Nutritional deficiencies, such as low vitamin D and B12, may increase oxidative stress and inflammation susceptibility. Additionally, traumatic events, including otologic surgery, temporal bone fractures, acoustic trauma, and barotrauma, can trigger SSNHL. Despite these associations, idiopathic cases dominate, highlighting the need for further research into underlying mechanisms [2,4-7].

A key area of investigation is the link between viral infections and SSNHL. Viruses such as herpes simplex, HIV, hepatitis, measles, rubella, mumps, Lassa virus, and enteroviruses have been implicated in its pathogenesis. Postmortem studies of SSNHL patients have shown degeneration of the organ of Corti and stria vascularis, consistent with viral labyrinthitis. These findings suggest that virus-induced inflammation may contribute to cochlear damage, a theory supported by the observed effectiveness of steroid therapy in many SSNHL cases [5-9].

Inflammatory markers have recently gained increasing attention as potential diagnostic and prognostic tools in SSNHL. Markers such as the neutrophil-to-lymphocyte ratio (NLR) and platelet-to-lymphocyte ratio (PLR) have been widely studied in various inflammatory and malignant conditions, and their relevance in SSNHL is now being recognized. These markers provide a quick, cost-effective means of assessing systemic inflammation, which could be linked to the onset and progression of SSNHL [10,11].

Recently, novel indices such as the Systemic Immune-Inflammation Index (SII) and Pan Immune-Inflammation Value (PIV) have emerged as comprehensive measures of systemic immune-inflammatory status. The SII is calculated by multiplying the platelet count by the neutrophil count and dividing by the lymphocyte count, while the PIV incorporates neutrophil, platelet, and monocyte counts in its calculation, divided by the lymphocyte count [12,13].

The present study investigated the association between inflammation and SSNHL by analyzing SII and PIV derived from routine complete blood count (CBC) tests. Using these cost-effective and widely available markers provides a novel approach to understanding the inflammatory mechanisms underlying SSNHL and their potential diagnostic and prognostic implications. To the best of our knowledge, this is one of the first studies to explore the utility of SII and PIV in SSNHL patients, contributing new insights into this complex and multifactorial condition.

2. Material ve Methods

Study Design

This retrospective observational study was carried out at the otolaryngology department of a tertiary medical center over a five-year period, from 2016 to 2021. The primary aim was to evaluate patients diagnosed with SSNHL and investigate the relationship between inflammatory markers and disease progression. The study adhered to rigorous ethical standards, with approval granted by the Izmir Bakıircay University Local Ethics Committee [No 1141, Research No 1121 at 24.08.2023].

All procedures and protocols were conducted in alignment with the principles outlined in the Declaration of Helsinki, ensuring the research maintained the highest standards of ethical integrity. Informed consent was obtained from every participant prior to their inclusion in the study. In the department, informed consent was always obtained from SSNHL patients for treatment agreement purposes and for using their information in research activities. Patients were assured that their data would remain confidential and anonymized throughout the

research process, and steps were taken to safeguard their privacy.

Additionally, the study emphasized transparency and impartiality. No conflicts of interest were identified, and all relevant ethical guidelines were strictly followed to ensure the validity and reliability of the findings. This meticulous approach aimed to establish a robust framework for analyzing the role of systemic inflammation in SSNHL while upholding the integrity of the research.

Patient Selection

The study included 200 patients with a confirmed diagnosis of SSNHL and 200 healthy individuals as a control group. The inclusion criteria for the SSNHL group required patients to present with hearing loss of more than 30 dB in at least three consecutive audiometric frequencies within three days and no identifiable external cause. Participants in the control group were healthy individuals undergoing routine preoperative evaluations for elective surgeries, such as septoplasty, with no history of otologic or systemic conditions.

Exclusion criteria for both groups included acute or chronic inflammatory conditions, active infections, renal or hepatic failure, chronic obstructive pulmonary disease, connective tissue disorders, inflammatory bowel diseases, malignancies, and otologic diseases, including chronic otitis media, otosclerosis, acoustic trauma, or Meniere's disease. Patients with a history of recent otologic surgery or head trauma were also excluded to ensure homogeneity of the study population.

All SSNHL patients underwent detailed clinical evaluations, including magnetic resonance imaging (MRI) with gadolinium enhancement, to exclude structural or other underlying otologic pathologies. Treatment for SSNHL consisted of a standardized regimen of oral prednisolone, initiated at 1 mg/kg per day and tapered gradually over 10 days. Laboratory investigations included a complete blood count (CBC) performed prior to treatment initiation. Relevant hematologic and biochemical data were extracted from patient medical records for analysis. These measures ensured the systematic assessment of inflammatory and clinical parameters across both groups.

Control Group

The control group consisted of 200 healthy individuals scheduled for elective septoplasty or septorhinoplasty, with routine preoperative blood tests conducted during anesthesia evaluations. These individuals were carefully screened to exclude any inflammatory conditions, malignancies, or chronic diseases, ensuring their suitability as controls.

Auditory Assessment

In a controlled clinical setting, hearing thresholds were evaluated using a calibrated audiometer (AC 40, Interacoustics, Denmark). The measurements were conducted in compliance with established audiological standards to ensure accuracy and reproducibility. Pure-tone audiometry was performed to determine air and bone conduction thresholds at standard frequencies of 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz, following established audiological standards. This comprehensive assessment ensured accuracy and reproducibility, forming the basis for evaluating hearing function and categorizing patients by hearing loss severity.

The severity of hearing loss was classified according to the American Speech-Language-Hearing Association (ASHA) criteria [14,15]. Patients were stratified into five distinct categories based on their average pure-tone threshold across key frequencies (500 Hz, 1 kHz, 2 kHz, and 4 kHz):

- **Mild Hearing Loss:** Average thresholds between 16–40 dB HL.
- **Moderate Hearing Loss:** Average thresholds between 41–55 dB HL.
- **Moderately Severe Hearing Loss:** Average thresholds between 56–70 dB HL.
- **Severe Hearing Loss:** Average thresholds between 71–90 dB HL.
- **Profound Hearing Loss:** Thresholds exceeding 91 dB HL.

These classifications allowed for a detailed grouping of patients according to the severity of their auditory impairment. The categorization was critical for analyzing the relationship between hearing loss severity and associated inflammatory markers. Additionally, these standardized criteria ensured consistency across all evaluations, enabling meaningful comparisons within the study cohort and with external research.

The audiological profiles derived from this assessment formed a foundation for the subsequent analysis of clinical outcomes, aiding in identifying

potential prognostic factors related to sudden sensorineural hearing loss.

Laboratory Analysis

Complete blood count (CBC) tests were performed for all participants. Blood samples were collected into EDTA (ethylenediaminetetraacetic acid) containing tubes and analyzed using an automated hematology analyzer (Beckman Coulter LH 780 Hematology Analyzer, USA). The Systemic Immune-Inflammation Index (SII) and Pan Immune-Inflammation Value (PIV) were calculated using CBC parameters.

Statistical Analysis

Data analysis was performed using SPSS 20.0 (IBM, Chicago, IL, USA). Continuous variables were reported as mean ± SD, and categorical data as frequencies (percentages). The Mann–Whitney U test compared non-normally distributed groups, and the Chi-square test assessed categorical relationships. Univariate logistic regression evaluated factor effects. ROC curve analysis determined the predictive accuracy of preoperative eosinophil counts and the SII index, identifying optimal thresholds and diagnostic metrics. Statistical significance was set at $p < 0.05$

3. Results

Demographic and Baseline Characteristics

The study cohort included 200 patients diagnosed with SSNHL and 200 healthy controls. The mean age of the SSNHL patients was 42.47 ± 12.02 years, closely matching the control group's mean age of 42.43 ± 9.7 years, with no statistically significant difference between the groups ($p = 0.971$). The gender distribution was also comparable, with the SSNHL group consisting of 88 females and 112 males, while the control group comprised 97 females and 103 males ($p = 0.133$). These findings indicate that age and gender were not confounding factors in the analysis (Table 1).

Clinical Presentation of SSNHL Patients

Among the SSNHL group, hearing loss affected the right ear in 102 patients' left ear in 98 patients. Additional symptoms included tinnitus, reported in 105 patients (52.5%), and dizziness, experienced by 47 patients (23.5%). The severity of hearing impairment varied widely, with ten patients classified as having mild hearing loss, 41 as moderate, 47 as moderately severe, 54 as severe, and 48 as profound. On average, patients presented with symptoms 4.04 ± 3.32 days after the onset of hearing loss. These clinical characteristics provide insights into the heterogeneity of SSNHL in terms of symptomatology and severity (Table 1). The two groups had no significant differences regarding comorbidities such as diabetes, hypertension, or cardiovascular diseases. Lifestyle factors, including smoking, alcohol consumption, and other unhealthy habits, were also comparable between the groups, with no statistically significant differences observed ($p > 0.05$).

Table 1. Demographic and CBC results of the groups

Variables	Patient Group	Control Group	p
Age	42.47 ±12.02	42.43 ±9.7	=0.971
Sex			=0.133
Female	112	97	
Male	88	103	
WBC (10^3/u)	8.79±2.76	7.96±2.34	=0.001
Neutrophil (10^3/u)	6,08±2.46	4.31±1.25	=0.00
Lymphocyte (10^3/u)	2.23±0.87	2.33±0.75	=0.21
Monocyte (10^3/u)	0.60±0.26	0.60±0.18	=0.946
Platelet (10^3/u)	279.15±66.04	268±58.83	=0.081
SII (10^9/L)	953.72±855.02	561.74±355.60	=0.00
PIV	523.84±455.48	342.48±245.47	=0.00
NLR	3.43±2.99	2.10±1.28	=0.00

Table 2. Diagnostic Accuracy of SII, NLR, and PIV Parameters in SSNHL Patients: ROC Analysis

Parameters	Cut off	AUC (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	p
SII	626.96	0.693	58.5	76	<0.001
PIV	392.75	0.648	51.5	73	<0.001

Clinical Features of SSNHL Patients

Inflammatory Marker Analysis

SII: The mean SII value in the SSNHL group was significantly elevated (953.72 ± 855.02) compared to the control group (561.74 ± 355.60), with a p-value < 0.001. This indicates a marked systemic inflammatory response in patients with SSNHL.

PIV: Similarly, PIV values were notably higher in SSNHL patients (523.84 ± 455.48) than in controls (342.48 ± 245.47), demonstrating statistical significance ($p < 0.001$). These findings further emphasize the presence of heightened immune-inflammatory activity in the patient group.

NLR: The mean NLR was also significantly elevated in SSNHL patients (3.43 ± 2.99) compared to the control group (2.10 ± 1.28), with a p-value < 0.001. This highlights NLR as a potential indicator of the inflammatory burden associated with SSNHL.

Hematologic Parameters

WBC Count: Patients with SSNHL had a significantly higher mean WBC count (8.79 ± 2.76) compared to controls (7.96 ± 2.34; $p = 0.001$).

Neutrophil Count:A similar trend was observed for neutrophil counts, which were elevated in the SSNHL group (6.08 ± 2.46) relative to controls (4.31 ± 1.25; $p < 0.001$).

Other Parameters: No significant differences were detected in lymphocyte, monocyte, or platelet counts between the two groups, suggesting that these components may not be the primary drivers of the observed inflammatory response (Table 1).

Diagnostic Utility of Inflammatory Markers

SII: Receiver Operating Characteristic (ROC) analysis revealed a cut-off value of 626.96 for SII, with a sensitivity of 58.5% and specificity of 76%. The area under the curve (AUC) was 0.693 ($p < 0.001$), indicating moderate diagnostic accuracy.

PIV: For PIV, the ROC analysis identified a cut-off value of 392.75, with a sensitivity of 51.5% and specificity of 73%. The AUC for PIV was 0.648 ($p < 0.001$), reflecting its utility as a diagnostic marker.

NLR: The optimal cut-off value for NLR was determined to be 2.38, with sensitivity and specificity values of 54.5% and 76.5%, respectively. The AUC was 0.692 ($p < 0.001$), comparable to SII's.

Visualization of Diagnostic Performance

Figure 1 presents the ROC curves for SII, PIV, and NLR, illustrating their predictive capabilities in distinguishing SSNHL patients from healthy controls.

Table 2 details the ROC analysis results, including sensitivity, specificity, and AUC values.

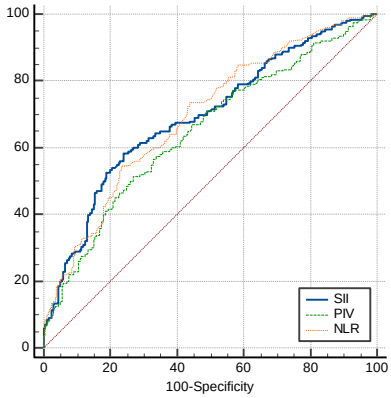

Figure 1. ROC Curves Illustrating the Diagnostic Performance of SII, NLR, and PIV Parameters in SSNHL Patients Compared to Controls

1. Discussion

Key Findings

This research highlights the significant involvement of systemic inflammation in developing SSNHL. Elevated levels of key inflammatory markers, such as the SII, PIV, and NLR, were observed in patients with SSNHL compared to healthy controls. These findings underscore a potential link between increased inflammatory activity and the pathophysiological processes underlying SSNHL, suggesting that inflammation may be pivotal in triggering or exacerbating this condition.

Elevated SII, PIV, and NLR levels in SSNHL patients may indicate an underlying immune response or inflammatory cascade. Systemic inflammation, a common factor in various conditions, could cause vascular or cochlear damage, leading to auditory impairment in SSNHL [11-13]. These results align with prior studies suggesting that inflammation may disrupt the delicate microenvironment of the inner ear, affecting cochlear homeostasis and contributing to sudden hearing loss.

The elevated SII, PIV, and NLR levels highlight their potential as diagnostic and prognostic markers in SSNHL. These indices, integrating neutrophils, lymphocytes, monocytes, and platelets, provide a comprehensive, rapid, and non-invasive measure of systemic inflammation. Our findings align with Jeon et al., who also emphasized the prognostic value of biomarkers like low NLR, monocyte counts, and fibrinogen levels in SSNHL [16]. Both studies underline the significant role of systemic inflammation in the pathogenesis and recovery of SSNHL, with our results further supporting the utility of NLR, SII, and PIV as robust indicators in clinical settings.

These findings highlight the critical role of inflammation in the pathogenesis of SSNHL, emphasizing the potential for targeted anti-inflammatory therapies as a treatment strategy. In this study, significantly elevated levels of systemic inflammatory markers were observed in SSNHL patients compared to controls, including NLR (3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$), SII (953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$), and PIV (523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$). Early identification of these markers may help clinicians tailor treatments, improving outcomes and preventing irreversible hearing loss. Moreover, the diagnostic performance of these markers, with AUC values of 0.693 (SII), 0.648 (PIV), and 0.692 (NLR), supports their inclusion in routine clinical evaluations for SSNHL. Their use could enhance diagnostic accuracy, assist in stratifying disease severity, and provide valuable prognostic insights into recovery potential. Our study complements the findings of Andrea Frosolini et al., who identified elevated CRP levels (pooled mean difference: 1.07, 95% CI: 0.03–2.11) as a diagnostic marker in SSNHL patients [17]. Similarly, we observed significantly higher inflammatory indices in SSNHL patients compared to controls: NLR (3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$), SII (953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$), and PIV (523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$). While Frosolini et al. noted variability in TNF-α levels, our findings underscore the diagnostic utility of composite markers like SII and PIV, which provide

consistent insights into the inflammatory mechanisms underlying SSNHL.

Our study significantly advances our understanding of the role of systemic inflammation in SSNHL and lays the groundwork for future investigations. Continued research is necessary to elucidate further the mechanisms linking these inflammatory markers to SSNHL and to determine their long-term prognostic value in diverse patient populations.

Role of Chronic Inflammation in SSNHL

SSNHL is mostly idiopathic, but evidence suggests chronic inflammation plays a key role. Studies have linked elevated markers like neutrophils, hs-CRP, and procalcitonin to disease severity [18,19]. Our study reinforces this inflammatory hypothesis, demonstrating significantly higher levels of systemic inflammatory indices in SSNHL patients compared to healthy controls: NLR (3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$), SII (953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$), and PIV (523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$). These markers indicate increased inflammation and correlate with hearing loss severity, with 48 patients having profound and 54 severe loss. Our findings suggest that inflammation disrupts cochlear homeostasis, contributing to SSNHL.

The acute rise in inflammatory markers in SSNHL patients suggests a distinct mechanism behind the disease's rapid onset [7-13].In our study, patients with SSNHL demonstrated significantly elevated markers such as NLR (3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$), SII (953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$), and PIV (523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$) compared to controls. These acute fluctuations suggest a unique process involving vascular permeability, oxidative stress, and immune-driven cochlear damage. The markers correlate with hearing loss severity, seen in 48 profound and 54 severe cases, highlighting systemic inflammation's role in SSNHL and the need for further study.

Neutrophil-to-Lymphocyte Ratio (NLR)

The NLR has gained widespread recognition as a simple, accessible, and reliable marker of systemic inflammation. Its utility spans multiple medical fields, including oncology, where it predicts tumor progression and outcomes [20]; cardiology, as a prognostic indicator in acute coronary syndromes and heart failure [21]; and inflammatory diseases such as ulcerative colitis, sepsis, and appendicitis [22,23]. Consistent with these applications, our study revealed significantly elevated NLR levels in SSNHL patients compared to controls (3.43 ± 2.99 vs. 2.10 ± 1.28, $p < 0.001$), supporting its role in acute inflammatory conditions.

These findings align with the work of Ulu et al., who similarly reported higher NLR values in idiopathic SSNHL patients [24]. The elevated NLR levels in our study indicate an immune imbalance, with increased neutrophil activity and reduced lymphocytes, potentially worsening cochlear inflammation and causing auditory dysfunction. NLR's simplicity, reliability, and predictive value make it a useful marker for detecting and monitoring systemic inflammation in SSNHL patients.

Systemic Immune-Inflammation Index (SII)

Initially introduced as a prognostic tool in oncology, the SII comprehensively measures immune-inflammatory status by integrating neutrophil, platelet, and lymphocyte counts [25]. In our study, the mean SII value in SSNHL patients was significantly higher compared to the control group (953.72 ± 855.02 vs. 561.74 ± 355.60, $p < 0.001$). Moreover, SII demonstrated superior sensitivity (58.5%) and AUC values (0.693) compared to NLR in differentiating SSNHL patients from healthy controls, suggesting its potential as a more robust and nuanced assessment of systemic inflammation in the context of SSNHL.

Including platelets in SII highlights their role in inflammation and vascular function. Elevated SII levels in our study suggest heightened inflammation and thrombosis, contributing to microvascular and cochlear damage. SII's integration of multiple inflammatory markers makes it a valuable tool for diagnosing and predicting SSNHL severity and outcomes**.**

Pan Immune-Inflammation Value (PIV)

The PIV is a relatively new biomarker that integrates neutrophil, platelet, monocyte, and lymphocyte counts, offering a holistic measure of systemic inflammation and immune response. In our study, PIV levels were significantly elevated in SSNHL patients compared to the control group (523.84 ± 455.48 vs. 342.48 ± 245.47, $p < 0.001$), highlighting its potential relevance in inflammation-driven conditions like SSNHL. Furthermore, the ROC analysis showed a sensitivity of 51.5% and an AUC value of 0.648, supporting its role in distinguishing SSNHL patients from healthy individuals.

PIV, unlike NLR and SII, offers a broader view of immune response by including monocytes, aiding in detecting chronic inflammation. Elevated PIV levels in our study highlight its potential as both a diagnostic marker and an indicator of disease progression and treatment response in SSNHL

Study Strengths and Limitations

This study contributes to understanding SSNHL by evaluating the relationship between NLR, SII, and PIV with the disease. It is the first to investigate SII and PIV in SSNHL, offering new insights into the link between systemic inflammation and auditory dysfunction. The use of routine, cost-effective blood tests enhances clinical practicality.

However, the single-center design may limit generalizability, and the retrospective nature prevents establishing causality. Future multicenter studies with larger, diverse cohorts are needed to validate these findings, assess the prognostic value of these markers, and explore their potential as therapeutic targets.

Implications for Future Research

Our study highlights the importance of inflammatory markers in SSNHL, but further research is essential to assess their prognostic value and role in predicting long-term outcomes. Future studies should explore the mechanisms linking systemic inflammation to SSNHL and compare how different treatment protocols affect these markers. Evaluating changes in inflammatory indices before and after treatment could provide deeper insights into their potential as indicators of therapeutic efficacy and guide the development of targeted anti-inflammatory therapies.

2. Conclusion

In summary, this study identifies elevated NLR, SII, and PIV levels as significant markers of systemic inflammation in SSNHL patients. These findings emphasize the potential utility of these indices in understanding the etiology of SSNHL and identifying patients at risk of unfavorable outcomes. Further research is essential to explore these inflammatory markers' predictive and therapeutic implications in SSNHL management.

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Abbreviations

- **AİK:** Ani İşitme Kaybı (Sudden Hearing Loss)
- **AUC:** Area Under the Curve
- **ASHA:** American Speech-Language-Hearing Association
- **CBC:** Complete Blood Count
- **CI:** Confidence Interval
- **CRP:** C-Reactive Protein
- **dB HL:** Decibels Hearing Level
- **EDTA:** Ethylenediaminetetraacetic Acid
- **hs-CRP:** High-Sensitivity C-Reactive Protein
- **MRI:** Magnetic Resonance Imaging
- **NLR:** Neutrophil-to-Lymphocyte Ratio
- **PIV:** Pan-Immune-Inflammation Value
- **PLR:** Platelet-to-Lymphocyte Ratio
- **p-value:** Probability Value (Statistical Significance)
- **ROC:** Receiver Operating Characteristic
- **SD:** Standard Deviation
- **SII:** Systemic Immune-Inflammation Index
- **SPSS:** Statistical Package for the Social Sciences
- **SSNHL:** Sudden Sensorineural Hearing Loss
- **TNF-*α*:** Tumor Necrosis Factor-alpha
- **WBC:** White Blood Cell

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Evaluation of YouTube Videos in Information about Thyroid Diseases During Pregnancy

Bir Çalışma Gebelikte Tiroid Hastalıkları Bilgilendirmesinde YouTube Videolarının Değerlendirilmesi

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Abstract: Access to quality and reliable information sources during pregnancy, which is a special period, is important for both maternal and fetal health. The reliability and quality of the information obtained from video platforms such as YouTube are important. This study was designed to evaluate the quality and reliability of YouTube videos on thyroid disorders which are common during pregnancy. A total of 248 videos found on YouTube with the keywords 'thyroid disorders during pregnancy,' 'pregnancy and thyroid disorders' and 'pregnancy and thyroid gland' were recorded. After applying criteria, the remaining 68 videos were evaluated. General characteristics of the videos, modified DISCERN scoring and Global Quality Scale (GQS) scoring were performed. The videos were divided into two groups based on their sources: Obstetricians and Gynecologists, and Internal Medicine/Endocrinology physicians. A 10-parameter scoring system including necessary information about thyroid disease during pregnancy was used. As a result of the analysis of 68 videos evaluated in the study; it was observed that the information on diagnosis and treatment in the videos prepared by Internal Medicine/Endocrinology physicians regarding of thyroid diseases in pregnancy was better than the videos prepared by Obstetrics and Gynecology physicians ($p<0.05$). When videos were evaluated in terms of quality and reliability, both groups were found to have similar quality and reliability. When all videos were analyzed, 41% were classified of high quality, 41% were of medium quality, and 18% were of low quality. The quality and reliability of YouTube videos on thyroid diseases during pregnancy were found to be high. However, the video content needs to be more comprehensive.
Keywords: YouTube, Thyroid Disease, Pregnancy

Özet: Özel bir dönem olan gebelikte kaliteli ve güvenilir bilgi kaynağına ulaşım hem anne hem de fetüs sağlığı için önemlidir. Bu dönemde YouTube gibi video platformlarından öğrenilen bilgilerin güvenilirliği ve kalitesi önemlidir. gebelik döneminde sık görülen tiroid bozuklukları ile ilgili YouTube video kalite ve güvenilirliğinin değerlendirilmesi için bu çalışma dizayn edilmiştir. YouTube'da, 'gebelik döneminde tiroid hastalıkları', 'gebelik ve tiroid bozuklukları' ve 'gebelik ve tiroid bezi' anahtar kelimeleri ile bulunan 248 video kaydedildi. Dışlama kriterleri sonrasında kalan 68 video değerlendirildi. Videoların genel özellikleri, modifiye DISCERN skorlaması ve Global Quality Scale (GQS) skorlaması yapıldı. Videolar kaynaklarına göre Kadın Hastalıkları ve Doğum doktorları ile İç Hastalıkları/Endokrinoloji doktorları olmak üzere iki gruba ayrıldı. Gebelik döneminde tiroid hastalığı ile ilgili gerekli bilgileri içeren 10 parametrelik bir puanlama sistemi kullanıldı. Çalışmada değerlendirilen 68 video analizinin sonucunda; gebelikte tiroid hastalıkları açısından İç Hastalıkları/Endokrinoloji doktorlarının hazırladıkları videolarda tanı ve tedavi konusundaki bilgilerin Kadın Hastalıkları ve Doğum doktorlarının hazırladığı videolardan daha iyi olduğu görüldü ($p< 0,05$). Paylaşılan videoların, kalite ve güvenilirlik açısından değerlendirildiğinde her iki grupta benzer kalite ve güvenilirlikte olduğu görüldü. Videoların tamamı incelendiğinde %41'inin yüksek kalitede, %41'inin orta kalitede, %18'inin düşük kalitede olduğu görüldü. Gebelikte tiroid hastalıkları ile ilgili YouTube'da yayınlanan videoların kalite ve güvenilirliği yüksek bulunmuştur. Ancak video içeriklerinin daha kapsamlı hale getirilmesi gerekmektedir.
Anahtar Kelimeler: YouTube, Tiroid Hastalığı, Gebelik

Ethics Committee Approval: Ethics committee approval was not received because the study was conducted on the public YouTube Video platform.

Informed Consent: The authors declared that informed consent form was signed by the participants.

Authorship Contributions Video viewing: DT, SK. Concept: DT, DY. Design: DT, OA. Data Collection or Processing: DT, SK. Analysis or Comment: DT, OA, DY. Literature Review: DT, SK. Writing: DT, VYT

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1. Introduction

Nowadays, the internet is frequently used for health research. For pregnant women, who are a special population, the reliability and quality of information are especially important. Misinformation may pose a risk to both maternal and infant health.

Some physiological changes may occur in thyroid hormones during pregnancy. Thyroid stimulating hormone (TSH) level decreases due to the trotrophic effect of human chorionic gonadotropin (hCG) hormone secreted from the corpus luteum in early pregnancy and from the placenta in late pregnancy. Since hCG and TSH have a common alpha subunits, weak thyroid stimulating effect of hCG occurs (1). Hypothyroidism, hypertroidism or subclinical hypothyroidism due to physiological changes may affect both mother and fetus. However, not all fluctuations in thyroid function tests that occur during pregnancy are pathological. Although the fetal thyroid gland becomes functional between 10-12 weeks, it does not mature until 18-20 weeks and the fetus benefits from maternal thyroid hormone in early pregnancy(2). Preterm labour, miscarriage, low birth weight and impaired fetal neurodevelopment may be seen due to untreated hypothyroidism.

The American College of Obstetricians and Gynaecologists (ACOG) recommends that thyroid function tests in pregnant women be kept within a certain trimester-specific range. The trimester-specific TSH range varies during pregnancy. Symptomatic patients whose TSH values are not within the specified range or who are clinically symptomatic should be treated. Iodine, has an important role not only in thyroid hormone production, but also during pregnancy period. The need for dietary iodine intake increases by approximately 50% during pregnancy. In case of insufficient iodine intake, pregnant women should be informed and necessary iodine supplementation should be made for these women. Thyroid function tests of pregnant women who get supplementation or treatment should be followed up in every 4-6 weeks (3).

It has been shown that the internet and digital media usage has been gradually increasing among pregnant women in the United States of America (4). Pregnant women use the internet to obtain some information about frequently curious topics such as fetal development, pregnancy complications, drug use, and weight gain during pregnancy (5). YouTube is one of the most used web-based platform where health information resources are frequently used[6]. Accessing to YouTube which is the most widely used global network facilitates getting some information, since the internet access has become easy and cheap associated with the development of the information technologies worldwide. It is necessary to evaluate whether the content and quality of the videos presented here are appropriate and additionally we should keep in mind that there may be incomplete and misleading information. Especially in a special period such as pregnancy, getting some misinformation may pose some risks for both mothers and babies. Accessing to reliable and high quality video content becomes even more important in this period.

It is important to evaluate thyroid gland functions during pregnancy and inform pregnant women about this issue. In our study, we aimed to evaluate the content, quality and reliability of videos related to thyroid diseases during pregnancy on the YouTube video platform, which is easily accessible.

2. Materials and Methods

In our study, the videos related to thyroid diseases during pregnancy on YouTube, were examined on 30 September 2024. Three trending topics related to thyroid diseases during pregnancy were selected in the search engine and a search was performed after cache cleaning. The search was performed with the keywords ‘thyroid diseases during pregnancy’, ‘pregnancy and thyroid disorders’ and ‘pregnancy and thyroid gland’.

As a result of the keywords typed into the search engine, a total of 248 videos were carefully monitored by two independent investigators, taking into account the exclusion criteria. Previous studies have shown that the majority of internet searches look at the first page and more than 83% view the first 3 pages (7). Therefore, the sample size was made by considering the first 3 pages.

Exclusion criteria (Figure 1);

1. Narration of the video by someone other than a specialist in Gynaecology and Obstetrics, Internal Medicine/Endocrinology

2. Having video content independent from the subject

3. Having repetitive video

4. Audio is not clearly understood in the video

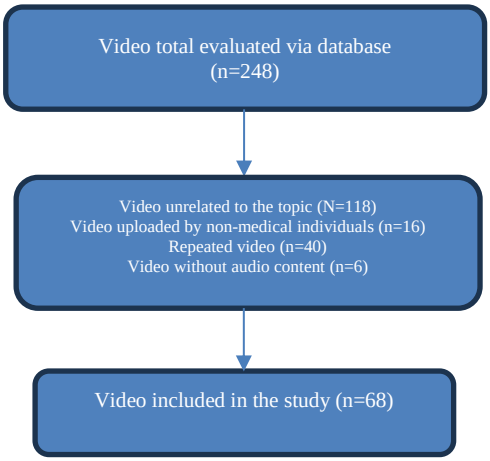

Figure 1. Flowchart of video selection according to exclusion criteria

Descriptive video characteristics such as URL addresses of the videos included in the study, the source of the video, duration (seconds), number of likes and dislikes, number of comments, number of views, time elapsed since the video was published (days) were collected. Parameters related to thyroid diseases in pregnancy were evaluated to determine the appropriateness of the video content to the subject matter.

Reliability assessment

The reliability and integrity of the video contents were assessed using the modified DISCERN (m DISCERN) scale. This scale is a scale created to evaluate the reliability of information about the questions and treatment options of individuals about any problem in terms of health care. The m DISCERN scale, which was adapted from the original DISCERN scale, includes five questions with 'yes and no' answers (8).

These questions are

1- Have reliable sources of information been used?

2- Are additional sources related to the problem indicated?

3- Are the answers to the question presented in a balanced and impartial manner?

4- Is the video short, clear and understandable?

5- Are controversial issues related to the subject mentioned?

The reliability of the information given in the video was scored from 1 to 5 by giving '1' point if the answer to these questions is yes and '0' point if no.

Quality assessment

The Global Quality Scale (GQS) is a scale that uses a scoring system from 1 to 5 that provides information about the usability, quality and flow of videos. According to this system, 1-2 points indicate low quality, 3 points indicate medium quality, and 4-5 points indicate high quality (9).

The parameters used in the GQS scale are as follows;

1- Video quality is low, site flow is slow, information is insufficient, content is not suitable for patients

2- In general terms, the video quality is poor, the flow is weak and most of the information on the subject is missing, the use for patients is limited

3- Medium quality and fluency video, some of the important information is discussed but there is missing information, partially sufficient for patients

4- The video quality and flow are good, it contains most of the information on the subject and controversial issues are addressed, useful for patients

5- Video quality and content are at a high level, useful for patients, and provide clear information on the subject.

Evaluation of video content parameters

It is expected that the necessary topics and content should be in the video in order to inform the patients about thyroid diseases in pregnancy. The question titles related to these topics were evaluated in the video content, and 1 point was given if these questions were answered in the video, and 0 points were given if not.

Parameters in the video content:

1- Is general information about thyroid diseases in pregnancy given (complaints, symptoms, etc.)?

2- Is information about TSH values appropriate for the gestational week provided?

3- Is information provided about how to diagnose thyroid disease during pregnancy?

4- Is information provided about the treatment to be given to patients with thyroid disease?

5- Is information provided about the frequency of thyroid disease during pregnancy?

6- Have pregnant women been provided with information about nutrition in thyroid disorders?

7- Is information provided about the possible effects of this period on the fetus?

8- Is information provided about the follow-up periods of thyroid patients during pregnancy?

9- Is information provided about general recommendations for patients with thyroid disease?

10- Is information provided for the follow-up of patients with thyroid disease after pregnancy?

Ethical approval

Since YouTube™ is an open platform, no human human or animal participants was included in the study because the videos watched were general information videos and no Ethics Committee approval was required in this study, as in similar studies(10).

Statistical analysis

Statistical analysis of our study was performed using SPSS for Windows 20.0 (IBM SPSS, Chicago). In the evaluation of the data, nominal data were evaluated as number and percentage (%), measured data were evaluated as mean ± standard deviation, median value (minimum - maximum). Kolmogorov Smirnov test was used for normality distribution of the groups. Mann-Whitney U test and Kruskal-Wallis test were used for non-parametric variables and Chi-Square test was used for the evaluation of categorical data. $p<0.05$ was accepted as statistically significant.

3. Results

Total of 248 videos reviewed in our study, 118 were found to be irrelevant, 16 were uploaded by non-medical individuals, 40 were repetitive videos, 6 had unclear audio content and were excluded from the study. The remaining 68 videos were included into the study (Figure 1). The general characteristics of the videos included in the study such as video duration, number of views, number of likes/dislikes, number of comments, number of days the video was shown in Table 1.

The videos included in the study were divided into two groups as Obstetrics and Gynecology and Internal Medicine/Endocrinology doctors according to the source who prepared the videos. It was found that 35 of the videos were prepared by Obstetrics and Gynaecology doctors and 33 by Internal Medicine/Endocrinology doctors. When the videos were divided into groups according to their sources, and there were no statistically significant difference between the two groups in terms of video duration, number of views, number of likes, number of comments, and number of days the video was published. The mean GQS scores and m DISCERN scores were 3.23±1.01 and 3.23±1.11; 3.42±0.93 and 3.61±0.82 in the videos prepared by Gynecology and Obstetrics and Internal Medicine / Endocrinology doctors, respectively. No statistically significant difference was observed between the two groups in terms of mean GQS and m DISCERN scores ($p>0.05$) (Table 2).

It was found that the rate of informing about the diagnosis of the disease was 0.66 ± 0.48 and the rate of informing about the treatment of the disease was 0.54 ± 0.50 in the Obstetrics and Gynecology physicians group, while the rate of providing informing about the diagnosis of the disease was 0.91 ± 0.29 and the rate of informing about the treatment of the disease was 0.79 ± 0.41 in the Internal Medicine/Endocrinology physicians group. The rate of mentioning the diagnosis and treatment of the disease was found to be statistically significantly higher in videos prepared by Internal Medicine / Endocrinology doctors ($p<0.05$).

All videos in the study were grouped as low quality (1 to 2), medium quality (3) and high quality (4 to 5) in terms of information quality according to GQS

score. Twelve videos were low quality (18%), 28 videos were medium quality (41%) and 28 videos were high quality (41%). The parameters that were found to be statistically significant as a result of pairwise comparison in the groups divided according to GQS scores were shown in Table 3. The publishing time of the high quality group was found to be statistically longer than the medium quality group. m DISCERN scoring and the number of views were statistically significantly higher in the high quality group than in the low and medium quality groups. When the videos were evaluated in terms of content parameters, it was found that information about how to diagnose the disease, treatment, follow-up period and possible effects of the disease on the foetus were statistically significantly higher in the high quality group compared to the other groups ($p<0.05$) (Table 3).

The distribution of video content parameters evaluated in the study shown in Table 4. It was observed that 68% of the videos provided general information about thyroid diseases, 78% of them about the diagnosing thyroid problems, 68% provided information about treatment of the disease and 69% were about possible effects on the fetus during pregnancy period.

It was observed that some information was included less than half of the videos, including 48% about TSH value appropriate for the gestational week, 30% about the frequency of thyroid diseases during pregnancy, 44% about the diet of pregnant women, 41% about the follow-up intervals of those with thyroid disease during pregnancy, 41% about general information about thyroid diseases during pregnancy, and 33% about post-pregnancy follow-up of those with thyroid disease during pregnancy (Table 4).

Table 1. Evaluation of general features of the videos (n=68)

	Mean ± SD	**Median (min – max)**
Video duration (minute)	4,01± 2,7	2,03 (1,1- 16,2)
Number of views	56790,74 ± 153289,57	5200 (37 - 981000)
Number of likes	404,65 ± 2885,04	10 (0 - 24000)
Number of dislikes	0 ± 0	0 (0 - 0)
Number of comments	37,19 ± 106,22	0 (0-549)
Number of days published	1697,40 ± 1059,23	1440 (270 – 3960)
GQS score	3,32 ± 0,96	3 (1- 5)
m DISCERN score	3,39 ± 1,03	3 (0 – 5)

m DİSCERN; Modified DİSCERN, GQS; Global Quality Scale

Table 2. Comparison of video content between two areas of expertise

	Obstetrics and Gynecology (n=35, 51,5%)		**Internal medicine / Endocrinology (n=33, 48,5%)**		**p**
	Mean± SD	**Median (min-max)**	**Mean± SD**	**Median (min-max)**	
Video duration (minutes)	5,8±3,56	1,5 (0,42 – 15,19)	5,4±3,3	2,06(0,24- 17,27)	0,597
Number of views	68514±180599,68	3800 (55 – 981000)	46007,07±122126,11	5200 (37- 639000)	0,547
Number of likes	730± 4049,83	10 (0- 24000)	71,67±181,71	11,00 (0- 820)	0,343
Number of comments	44,12± 118,72	1 (0 - 549)	30,94±94,70	0 (0- 523)	0,617
Number of days published	1768,2±1070,40	1800 (270 - 3960)	1629,9±1074	1350 (330 - 3960)	0,493
Information about the diagnosis of the disease	0,66 ± 0,48	1 (0-1)	0,91 ± 0,29	1 (0-1)	**0,011**
Information about the frequency of the disease	0,29 ± 0,45	0 (0-1)	0,33 ± 0,47	0 (0-1)	0,670
Information about the treatment of the disease	0,54 ± 0,50	1 (0-1)	0,79 ± 0,41	1 (0-1)	**0,032**
Information about follow-up of the disease	0,60 ± 1,53	0 (0-1)	0,52 ± 0,50	1 (0-1)	0,759
m DISCERN score	3,23±1,11	3 (1- 5)	3,61±0,82	4 (2 - 5)	0,116
GQS score	3,23±1,01	3,00 (1,00 - 5)	3,42±0,93	3 (2 - 5)	0,408

Mann- Whitney U test was used, m DİSCERN; Modified DİSCERN, GQS; Global Quality Scale

Table 3. Classification of videos according to quality scale

	Poor quality (n= 12, 18%)		Medium quality (n=28, 41%)		High quality (n=28, 41%)		p	Pairwise comparison results		
	Mean±SD	Median(min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)		P-M	M-H	P-H
Video duration(minutes)	4,66±5,15	1,41(1,11-14,14)	1,98 ± 2,66	1,24 (0,24-14,09)	5,45 ±5,15	3,36 (0,42-17,27)	**0,014**	-	+	-
Number of likes	66,84 ±93,15	25,00 (2-277)	903,18±4616,00	6 (0-24000)	97,92±181,23	16 (0-820)	0,171	-	-	-
Number of comments	42,16±113,99	8 (0-419)	30,59±107,73	0(0-549)	42,59±106,44	6 (0-523)	0,114	-	-	-
m DISCERN score	2,38±0,96	3 (1-4)	3,25±0,71	3(2-4)	4,03±080	4(2-5)	**0,000**	-	+	+
Information about the diagnosis of the disease	0,38±0,50	0(0-1)	0,77±0,42	1(0-1)	0,92±0,26	1(0-1)	**0,001**	+	-	+
Information about the treatment of the disease	0,46±0,51	0(0-1)	0,51±0,50	1(0-1)	0,92±0,26	1(0-1)	**0,001**	-	+	-
Information about the frequency of the disease	0,15±0,37	0(0-1)	0,22±0,42	0(0-1)	0,48±0,50	0(0-1)	0,056	-	-	-
Information about nutritional support	0,38±0,50	0(0-1)	0,33±0,48	0(0-1)	0,59±0,50	1(0-1)	0,090	-	-	-
Information about the effect on the fetus	0,38±0,50	0(0-1)	0,70±0,46	1(0-1)	0,88±0,32	1(0-1)	**0,004**	-	-	+
Information about the follow-up period of the disease	0,23±0,43	0(0-1)	0,22±0,42	0(0-1)	0,98±0,96	1(0-1)	**0,000**	-	+	+
Number of views	97032,23±268850,41	8200(55-981000)	29436,22±74393,51	1800(37-244000	67320,88±144036,12	9300(146-639000)	**0,038**	-	+	+
Provide general information	0,30±0,48	0(0-1)	0,37±0,49	0(0-1)	0,88±0,32	1(0-1)	0,052	-	-	-
Number of days published	1410,15±1140,61	1080(270-3930)	1830,77±1080,16	1140(390-3960)	1680,18±1020,15	1800(270-3960)	0,332	-	-	-

Kruskal Wallis test was used, m DİSCERN; Modified DİSCERN, GQS; Global Quality Scale, P; Poor quality, M; Medium quality, H; High quality

Table 4. Comparison of both areas of expertise according to video content

	Total (n=68, %)		Obstetrics and Gynecology		Internal medicine / Endocrinology	
	Yes	No	Yes	No	Yes	No
1. Has general information been given about thyroid diseases during pregnancy?	46 (68%)	22 (32%)	21	13	25	9
2. Has information been given about TSH values appropriate for the week of pregnancy?	33 (48%)	35 (52%)	16	15	17	20
3. Has information been given about how to diagnose thyroid disease during pregnancy?	53 (78%)	15 (22%)	23	11	30	4
4. Has information been given about the treatment to be given to those with thyroid disease during pregnancy?	46 (68%)	22 (32%)	20	16	26	6
5. Has information been given about the frequency of thyroid disease during pregnancy?	21 (30%)	47 (70%)	10	25	11	22
6. Has information been given about nutrition for those with thyroid disease during pregnancy?	30 (44%)	38 (56%)	16	19	14	19
7. Has information been given	47 (69%)	21 (31%)	25	11	22	10

about the possible effects of thyroid disease on the fetus during pregnancy?						
8. Is information given about the follow-up period of thyroid patients during pregnancy?	28 (41%)	40 (59%)	12	24	16	16
9. Are general recommendations given about thyroid disease during pregnancy?	28 (41%)	38 (59%)	14	22	14	16
10. Has information been given for follow-up after pregnancy?	23 (33%)	45 (67%)	12	26	11	19

4. Discussion

The accuracy and reliability of the information provided in these videos are important in terms of health literacy. Since pregnant women constitute a special group, Diseases that occur during pregnancy and the drugs used in their treatment are more important than other populations in terms of both women's and infants health. The quality and reliability of the videos published on public video platforms are as important as the content of the subjects described in the videos.

It is important that the quality and reliability of the videos should be high, because access to the information is easy and more useful in those platforms such as YouTube. We categorised the videos according to the quality using GQS scores and it was found that more than half of the videos had at least medium quality in our study. YouTube is a widely used video platform for the evaluation of health information resources and the videos may be published on various topics regarding diseases which were seen during pregnancy (11). During pregnancy, women often seek obtain some information easily on the topics such as drug use during pregnancy and gestational diabetes which might affect the individual and infants health via YouTube (12). In some studies, it has been concluded that patients have good glycaemic control and improved outcomes related to gestational diabetes with easy access to information and increased health literacy(13). There are many videos on YouTube about thyroid diseases in pregnancy. In our study, we evaluated the high quality and reliable videos on YouTube, and we found that pregnant women can benefit from YouTube by obtainig useful and true information about this issue.

Thyroid disorders cause maternal and fetal changes with different mechanisms at different periods during pregnancy. Hypothyroidism has been is estimated to occur in approximately 4% of pregnancies and hyperthyroidism in approximately 2.4% of pregnancies (14). Since fetal thyroid gland becomes functional around 18 to 20 weeks, transplacental passage of maternal thyroid hormone in early pregnancy becomes important for fetal development. Due to the weak thyrotropic effect of hCG, which is high in early pregnancy, causes TSH levels to be lower in pregnant women than in non-pregnant women (15). After the first trimester of pregnancy, TSH level tends to increase due to the decrease in hCG level. Therefore, TSH value reference intervals may vary during early pregnancy and in the later stages of pregnancy. These mechanisms should be considered in the diagnosis and treatment of thyroid disease. In our study, general information about thyroid diseases in pregnancy, diagnosis and treatment of thyroid diseases in pregnancy, and possible effects of thyroid diseases on the fetus were mentioned in more than half of the videos, suggesting that the use of YouTube video platform may be beneficial for pregnant women.

The diagnosis, treatment and follow-up process of the thyroid disease during pregnancy are performed by both Obstetrics and Gynecology and Internal Medicine / Endocrinology. In the current study, we have found that the contents and informations of the videos on YouTube were better prepared by Internal Medicine/Endocrinology compared to the Obstetricians and Gynecologists.

There are different opinions regarding the follow-up of thyroid diseases in pregnancy. The follow-up of the disease is performed in accordance with the recommendations of different organisations such as the American Thyroid Association, the World Health Organization, and the Turkish Society of Endocrinology and Metabolism. Which diets to be recommended for these patients were mentioned in less than half of the videos that we examined. In this respect, we think that YouTube video content should be improved.

A study of 223,512 pregnant women showed that untreated overt hypothyroidism was associated with an increased risk of preeclampsia, preterm delivery, gestational diabetes mellitus and neonatal intensive care unit admission[16]. Risk factors for thyroid dysfunction include a history of thyroid dysfunction, known thyroid antibody positivity, type 1 diabetes mellitus, morbid obesity, and living in iodine-deficient regions. Pregnant women with thyroid disease and using levothyroxine during pregnancy should be evaluated every 4 to 6 weeks until mid-pregnancy and then once in the second and third trimesters for a target value of TSH <2.5 mIU/L; the risk of complications may increase at higher values (17). While these risks have been shown in studies, we think that the diagnosis, treatment, risk factors and follow-up of the disease should be explained in more detail by Gynecologists and Obstetricians on the YouTube video platform.

During pregnancy, iodine requirement increases due to various factors. There is an increase in estrogen-mediated thyroid binding globulin and the requirement for the fetal thyroid gland increases in the advancing weeks of pregnancy. For these reasons, 220 to 250 μg of iodine intake per day is recommended during pregnancy(18). Daily oral supplements containing 150 μg of iodine should be recommended for women who are considering pregnancy, are pregnant or breastfeeding. According to our study data, we stated that sufficient information was not provided regarding general recommendations and diet; so more detailed information should be provided to pregnant women on YouTube informative videos regarding iodine use.

In a YouTube study on gout, videos posted by academic institutions and doctors were shown to have higher DISCERN and GQS scores and greater quality and reliability (19). In YouTube videos posted on umbilical hernia, DISCERN and GQS scores of videos posted by doctors were found to be higher (20). Studies showed that videos on health topics were more reliable and of higher quality when posted by doctors. Our study has shown that the topics posted by doctors may vary between different departments, but are similar in terms of quality and reliability. Using certain scales in the evaluation of YouTube videos is important in terms of quality and reliability standards.

Our Limitations

Since the videos published by non-medical individuals were not evaluated in our study, we could not comment on the reliability of other videos, which is the primary limitation of our study.

5. Conclusion

This study was conducted to evaluate the content, quality and reliability of videos published on the YouTube video platform to raise public awareness about thyroid diseases that are frequently encountered during pregnancy. Thyroid diseases are quite common during pregnancy and the management can be complicated due to the many rules that the pregnant should comply with. Many questions about thyroid diseases during pregnancy can remain unanswered for women. In order to solve these questions more clearly, it is important to have access more reliable sources for pregnant women. The more recent and reliable videos published on public video platforms such as YouTube are important providing the appropriate and useful information for those specific population. There may be deficiencies even in videos published by experts on the subject on this platform. In terms of diagnosis and treatment of thyroid diseases during pregnancy, Gynecologists and Obstetricians need to share more detailed and reliable information. Pregnant women may have difficulty accessing accurate information about thyroid diseases that occur during pregnancy from videos on YouTube video platforms.

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Retrospective Evaluation of Patients Admitted to Intensive Care Unit in Kahramanmaraş Centered Earthquakes in Türkiye: A Single Center Analysis

Kahramanmaraş Merkezli Depremlerde Yoğun Bakım Ünitesine Kabul Edilen Hastaların Retrospektif Değerlendirilmesi: Tek Merkez Analizi

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Abstract: On February 6, 2023, two major devastating earthquakes hit Turkey, impacting 11 provinces. Kahramanmaraş province was the epicenter. The aim of this study was to investigate the medical analysis and survival status of earthquake victims admitted to the intensive care unit (ICU) after these earthquakes. Factors associated with mortality among hospitalized earthquake victims were also explored. This retrospective, cross-sectional, single-center study was conducted on earthquake victims who were admitted to the ICU between February 6, 2023, and February 21, 2023. Data including demographic characteristics, Acute Physiology and Chronic Health Evaluation II (Apache II) scores, Glasgow Coma Scale (GCS) values, laboratory parameters, in- or out-of-institution referral status, survival status, length of stay in the ICU, and hemodialysis requirements of all the patients were recorded. Of the 45 earthquake victims (20 females and 25 males), the mean age was 38.9 ± 18.7 years. 25 patients were intubated at the time of admission to the ICU. A total of 19 patients required hemodialysis, 20 patients died, 9 patients were referred inside the hospital, 16 were referred outside the hospital. It was observed in the study that higher rates of intubation on admission, higher serum creatinine, procalcitonin, lactate and Apache II values, lower Ph, neutrophil/ lymphocyte ratio (NLR) and GCS values showed an increased risk of death. Earthquakes are life- threatening natural disasters. The definition of the clinical and laboratory parameters of the earthquake victims is crucial on the prediction of survival status.
Keywords: Death, earthquake, intensive care unit, trauma, earthquake victim

Özet: 6 Şubat 2023'te Türkiye'yi vuran iki büyük yıkıcı deprem 11 ili etkiledi. Kahramanmaraş ili merkez üssüydü. Bu çalışmanın amacı bu depremlerden sonra yoğun bakım ünitesine (YBÜ) yatırılan depremzedelerin tıbbi analizlerini ve hayatta kalma durumlarını araştırmaktı. Ayrıca depremde yatan hastaların ölümüyle ilgili faktörler de araştırıldı. Bu retrospektif, kesitsel, tek merkezli çalışma, 6 Şubat 2023 ile 21 Şubat 2023 tarihleri arasında yoğun bakım ünitesine yatırılan depremzedeler üzerinde gerçekleştirildi. Tüm hastaların demografik özellikleri, Akut Fizyoloji ve Kronik Sağlık Değerlendirmesi II (Apache II) skorları, Glasgow Koma Skalası (GKS) değerleri, laboratuvar parametreleri, kurum içi ve dışı sevk durumları, sağ kalım durumları, yoğun bakımda kalış süreleri, hemodiyaliz gereksinimleri gibi verileri kaydedildi.45 depremzede (20 kadın ve 25 erkek) yaş ortalaması 38,9 ± 18,7 yıl idi. Yoğun bakıma kabulde 25 hasta entübe idi. Toplam 19 hastaya hemodiyaliz uygulandı, 20 hasta öldü, 9 hasta hastane içine sevk edildi, 16 hasta hastane dışına sevk edildi. Çalışmada, kabulde daha yüksek entübasyon oranlarının, daha yüksek serum kreatinin, prokalsitonin, laktat ve Apache II değerlerinin, daha düşük Ph, nötrofil/lenfosit oranı (NLR) ve GKS değerlerinin ölüm riskini artırdığı gözlendi. Depremler yaşamı tehdit eden doğal afetlerdir. Deprem mağdurlarının klinik ve laboratuvar parametrelerinin tanımlanması, hayatta kalma durumunun tahmininde çok önemlidir.
Anahtar Kelimeler: Ölüm, deprem, yoğun bakım ünitesi, travma, depremzede

Ethics Committee Approval: The study was approved by Adana City Training and Research Hospital Clinical Research Ethical Committee (Decision no: 2765, Date: 17.08.2023).

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1. Introduction

Two major earthquakes hit Turkey on February 6, 2023, with a measured magnitude of 7.7 and 7.6 on the Richter scale. Kahramanmaraş province was the center of the earthquakes, and 10 other provinces of Turkey were also affected by the earthquake (1).

These earthquakes were not the first devastating ones, because Turkey is located on earthquake zones. In the past years, three major earthquakes, the Van earthquake in 2011, the Marmara earthquake in 1999 and the Erzincan earthquake in 1939, were the other deadliest earthquakes with a magnitude higher than 7.0 Richter scale that Turkey has experienced (2,3,4).

The sudden speed of onset, lack of warning systems, and aftershocks cause earthquakes to be devastating (5). After large and severe earthquakes, earthquake victims may experience injury, disability, multiple trauma and even death. Earthquake victims admitted to the intensive care unit (ICU) may require intubation, experience shock, suffer from multiple organ failure, or undergo limb amputation. Crush syndrome, acute kidney injury, compartment syndrome, infection, sepsis, septic shock may be observed in earthquake survivors in the ICU (6).

Demographic data, clinical and laboratory findings, and intensive care scoring values of the patients can be guiding for the course of the patients.

In a study age, respiratory rate, pulse rate, diastolic blood pressure, presence of coronary heart disease, chronic kidney disease, crush injury, malignant tumor and Glasgow Coma Scale (GCS), are defined as independent mortality related factors in early assessment of the adult earthquake victims (7).

Our aim in this study was to investigate the demographic characteristics, clinical and laboratory outcomes and survival status of the victims in the ICU within fifteen days following the Kahramanmaraş centered earthquakes. We also determined the factors related to earthquake inpatient death.

2. Materials and Methods

The local institutional Ethics Committee of Adana City Training and Research Hospital approved the study (approval no.2765 on August 17, 2023) and the study complied with the principles of the Helsinki Declaration.

This retrospective, cross-sectional, single-center study involved patients who were affected by the Kahramanmaraş centered earthquakes and admitted to the ICU of a training and research hospital. The study comprised of 45 earthquake victims who were admitted to the ICU between February 6, 2023, and February 21, 2023. Patients with missing data were not included in the study. The patients who were in the ICU at that time and were not earthquake victims were excluded from the study.

The earthquake victims' age, gender, length of stay in the ICU, whether they were intubated at the time of admission, whether hemodialysis was applied or not, and whether they died or were alive were recorded. Acute Physiology and Chronic Health Evaluation II (Apache II) scores and GCS values were recorded. Laboratory parameters of the earthquake victims (Serum sodium (Na) , serum potassium (K), serum blood urea nitrogen (BUN), serum creatinine, serum calcium, serum ionized calcium, serum albumin, serum aspartate aminotransferase (AST), serum alanine aminotransferase (ALT), white blood cell (WBC) count, hemoglobin (Hb), hematocrit (Htc), neutrophil/lymphocyte ratio (NLR), pH, lactate, C-reactive protein (CRP), procalcitonin) on admission to the ICU were recorded.

2.1. Statistical analysis

The statistical analysis carried out in this study was the IBM SPSS 25.0 (Armonk, NY: IBM Corp.) and MedCalc 15.8 (MedCalc Software bvba, Ostend, Belgium) program. Qualitative data was compared by using The Chi-Square (χ^2) test. The normality of the parameters was evaluated with the Shapiro-Wilk test, skewness-kurtosis and graphical methods (histogram, Q-Q Plot, Stem and Leaf, Boxplot). In the evaluation of normally distributed quantitative data, Independent Samples t test was used. For the evaluation of the data that is not normally distributed, Mann-Whitney U test was used. In order to determine the distinctiveness of the variables, The Receiver Operating Characteristic (ROC) curve method was used. In the determination of risk ratios, the Binary Logistic Regression test was used. Statistical significance level was accepted as α=0.05. Power analysis was performed with the statistical package program G*Power 3.1.9.7 (Franz Faul, Universitat Kiel, Germany); n1=25 (10.5 ± 4.7), n2=20 (5.6 ± 4.4), α=0.05, Effect Size (d) = 0.94; power = 87%.

3. Results

Among the forty- five earthquake victims in the ICU, there were 20 females and 25 males. The mean age of the patients was 38.9 ± 18.7 years (min: 12, max: 85). When admitted to the ICU, 25 patients were intubated and 20 of them were not intubated. The length of stay of the patients in the ICU was 7.2 ± 18.5 days (min: 1, max: 127). A total of 25 patients were discharged from the ICU; 9 of the patients were referred within the institution and 16 were referred outside the institution. Hemodialysis was applied to 19 of the patients. 20 of the patients died. The general characteristics of patients are shown in Table 1.

In comparisons made according to survival; a statistically significant difference ($p<0.05$) between survivors and non- survivors in terms of intubated status on admission, length of ICU stays, serum creatinine, procalcitonin, pH, lactate, NLR, Apache II, GCS, in-institution referral and out-of-institution referral values was determined.

In the non-survivor group, It was found that the rates of intubation on admission were higher, ICU stay times were shorter, serum creatinine, procalcitonin, lactate and Apache II values were higher, Ph, NLR and GCS values were lower, and there were no in-institution or out-of-institution referrals.

No statistically significant difference ($p>0.05$) between survival conditions in terms of other variables was determined. Table 2 shows the comparisons by survival of the patients.

Serum creatinine, procalcitonin, pH, lactate, NLR, Apache II score, GCS score and intubation on admission: these are the variables that have a clinically more significant difference in pairwise comparisons between Survival-Mortality status and that are not highly correlated. First, single logistic regression was performed on these variables, variables with $p<0.05$ were included in multiple logistic regression, the Backward Stepwise method was used in the analysis, and the model was finalized in the fourth step. In this model, approximately 45% of the dependent variable (Survival-Mortality) could be explained (Nagelkerke $R2 = 0.445$). According to this model, a statistically significant relationship between Survival-Mortality status and lactate, NLR and intubation on admission variables was observed ($p<0.05$).

Mortality is approximately 1-fold higher in those with high lactate values than in those without (OR,1,03; 95% CI,1,00-1,05), approximately 0.9-fold higher in those with high NLR values than in those without (OR,0,90; 95% CI,0,82-1,00) , and approximately 5-fold higher in those who are intubated at admission than in those without (OR,4,5; 95% CI,1,24-16,35). Table 3 shows the evaluations with logistic regression.

Variables found to have differences in pairwise comparisons were evaluated using ROC analysis. Table 4 shows the ROC analysis of serum creatinine, procalcitonin, Ph, lactate, NLR, Apache II score and GCS score. The ROC curve results of these parameters are also shown in Figure 1.a,1.b,1.c,1.d,1.e,1.f,1.g.

Table 1. General characteristics of the patients

		Mean ± SD	**Median(Min-Max)**
Gender *	Female	20	44.4
	Male	25	55.6
Age (years)		38.9 ± 18.7	36.0 (12.0 – 85.0)
Intubated status on admission to the ICU *	Yes	25	55.6
	No	20	44.4
Length of stay in the ICU (days)		7.2 ± 18.5	4.0 (1.0 – 127.0)
Referral inside the institution *	Yes	9	20.0
	No	36	80.0
Referral outside the institution *	Yes	16	35.6
	No	29	64.4
Glasgow Coma Scale Score		8.3 ± 5.2	6.0 (3.0 – 15.0)
Apache II Score		35.0 ± 13.1	34. 0 (8.0 – 62.0)
Hemodialysis *	Yes	19	42.2
	No	26	57.8
Death *	Yes	20	44.4
	No	25	55.6

*Data are presented as mean ± SD, median (min-max) values; *: n / %*

Table 2. Comparisons by survival of the patients

		Survivor (n=25)	**Non-survivor (n=20)**	**P value**
Gender	Female Male	11 (%44.0) 14 (%56.0)	9 (%45.0) 11 (%55.0)	1.000 [a]
Age (years)		38.0 ± 19.2	40.0 ± 18.5	0.732 [b]
Intubated status on admission to the ICU	Yes No	10 (%40.0) 15 (%60.0)	15 (%75.0) 5 (%25.0)	**0.034** [a]
Length of stay in the ICU (days)		7.0 (4.0-8.5)	2.0 (1.0-3.8)	**<0.001** [c]
Serum blood urea nitrogen (mg/dL)		82.0 (46.0-138.0)	86.0 (73.5-122.5)	0.424 [c]
Serum creatinine (mg/dL)		1.8 (0.8-3.4)	2.7 (1.8-3.5)	**0.032** [c]
Serum sodium (mmol/L)		138.6 ± 6.3	138.2 ± 6.1	0.793 [b]
Serum potassium (mmol/L)		5.4 ± 1.3	5.4 ± 1.4	0.980 [b]
Serum calcium (mg/dL)		7.6 ± 1.0	7.3 ± 1.2	0.399 [b]
Serum ionized calcium (mmol/L)		1.0 ± 0.2	0.9 ± 0.1	0.703 [b]
Serum albumin (g/L)		26.1 ± 6.3	22.3 ± 6.5	0.055 [b]
Serum aspartate aminotransferase (U/L)		306.0 (95.5-1039.5)	764.0 (185.0-1578.0)	0.185 [c]
Serum alanine aminotransferase (U/L)		154.0 (55.0-315.0)	335.0 (109.5-669.3)	0.083 [c]
C- reactive protein (mg/L)		112.4 (60.3-169.5)	141.5 (56.2-298.5)	0.288 [c]
Procalcitonin (ng/mL)		7.0 (0.5-20.5)	22.5 (6.4-73.6)	**0.038** [c]
pH		7.28 ± 0.12	7.13 ± 0.17	**0.002** [b]
Lactate (mmol/L)		21.0 (14.0-36.0)	49.5 (23.3-71.5)	**0.019** [c]
White blood cell count ($10^3/\mu L$)		16.4 (13.1-22.8)	15.6 (10.3-32.0)	0.855 [c]
Hemoglobin (g/dL)		11.2 (8.1-15.5)	9.3 (7.7-15.2)	0.615 [c]
Hematocrit (%)		34.4 (25.2-45.6)	29.4 (23.9-48.9)	0.982 [c]
Neutrophil/lymphocyte ratio		14.5 (9.4-20.5)	9.4 (7.9-15.6)	**0.040** [c]
Apache II Score		29.8 ± 12.4	41.6 ± 11.1	**0.002** [b]
Glasgow Coma Scale Score		12.0 (5.0-15.0)	3.0 (3.0-6.8)	**0.001** [c]
Referral inside the institution	Yes No	9 (%36.0) 16 (%64.0)	0 (%0.0) 20 (%100.0)	**0.002** [a]
Referral outside the institution	Yes No	16 (%64.0) 9 (%36.0)	0 (%0.0) 20 (%100.0)	**<0.001** [a]
Hemodialysis	Yes No	10 (%40.0) 15 (%60.0)	9 (%45.0) 11 (%55.0)	0.770 [a]

Data are presented as mean ± SD, n / %; a: Chi-Square Test (n (%)), b: Independent Samples t Test (Mean ± SD), c: Mann-Whitney U test (Median ((Q1-Q3))

Table 3. Evaluations with logistic regression

	Univariate logistic regression analysis						**Multivariate logistic regression analysis**					
Risk factor	B	SE	Wald	OR	95%CI	p*	B	SE	Wald	OR	95%CI	p*
Creatinine (mg/dL)	0.357	0.203	3.113	1.43	0.96 – 2.13	0.078	--	--	--	--	--	--
Procalcitonin (ng/mL)	-0.001	0.003	0.030	1.00	0.99 – 1.01	0.862	--	--	--	--	--	--
pH	-6.697	2.406	7.748	0.00	0.00 – 0.14	**0.005**	--	--	--	--	--	--
Lactate (mmol/L)	0.028	0.012	5.636	1.03	1.00 – 1.05	**0.018**	0.035	0.015	5.579	1.04	1.01 – 1.07	**0.018**
NLR	-0.100	0.050	3.973	0.90	0.82 – 1.00	**0.046**	-0.122	0.058	4.477	0.88	0.79 – 0.99	**0.034**
Apache II	0.084	0.030	7.668	1.09	1.02 – 1.15	**0.006**	--	--	--	--	--	--
GCS	-0.218	0.072	9.258	0.80	0.70 – 0.93	**0.002**	--	--	--	--	--	--
Intubation on admission	1.504	0.658	5.221	4.50	1.24 – 16.35	**0.022**	1.650	0.807	4.180	5.21	1.07 – 25.34	**0.041**

**: Binary Logistic Regression Test (It is given only for the variables remaining in the model), Nagelkerke R^2 = 0.445, Hosmer and Lemeshow Test = 0.065,*
Variable(s) removed on step 2: Apache II, step 3: GKS, step 4: Ph,
B=, SE=, Wald=, CI = confidence interval, OR = odds ratio.

Table 4. ROC analysis of the prognostic parameters in predicting mortality

	AUC	95%CI	Cut-off	Sensitivity	Specificity	Youden index	+PV	-PV	p value
Creatinine (mg/dL)	0.688	0.53 – 0.82	>1.35	95	44	0.390	57.6	91.7	0.019
Procalcitonin (ng/mL)	0.682	0.53 – 0.81	> 2.45	95	44	0.390	57.6	91.7	0.027
pH	0.767	0.62 – 0.88	≤7.15	70	88	0.580	82.4	78.6	0.001
Lactate (mmol/L)	0.706	0.55 – 0.83	>31	70	76	0.460	70.0	76.0	0.012
Neutrophil/lymphocyte ratio	0.680	0.52 – 0.81	≤8.85	50	84	0.340	71.4	67.7	0.027
Apache II	0.771	0.62 – 0.88	>29	95	56	0.510	63.3	93.3	0.00
GCS	0.785	0.64 – 0.89	≤4	70	84	0.540	77.8	77.8	0.00

AUC: area under curve, CI: confidence interval,

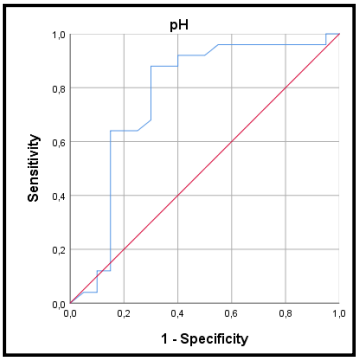

Figure 1.a ROC curve results of the Ph

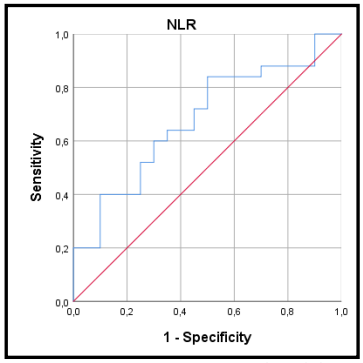

Figure 1.b ROC curve results of the NLR

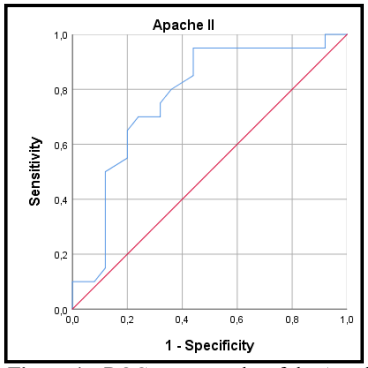

Figure 1.c ROC curve results of the Apache II

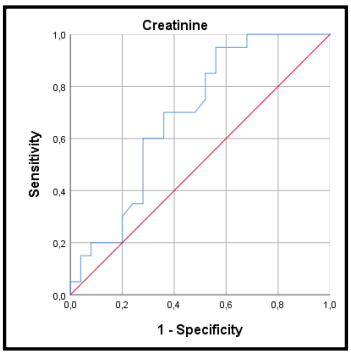

Figure 1.d ROC curve results of the Creatinine

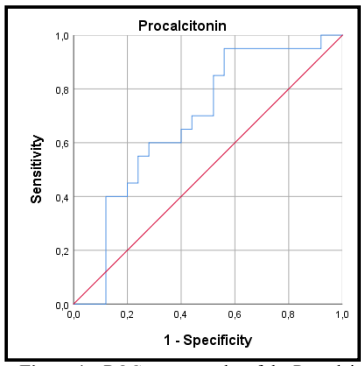

Figure 1.e ROC curve results of the Procalcitonin

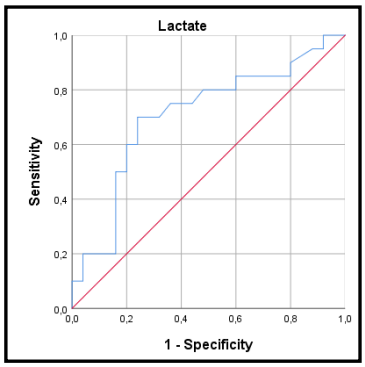

Figure 1.f ROC curve results of the Lactate

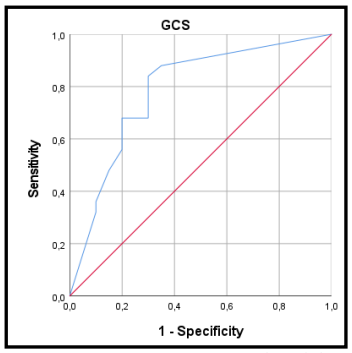

Figure 1.g ROC curve results of the GCS

4. Discussion

This single-center retrospective observational study included 45 earthquake victims admitted to the intensive care unit after devastating Kahramanmaraş centered earthquakes. Medical analysis and survival status of the earthquake victims were examined. Our study revealed that 8 factors were related to earthquake inpatient death: intubated status on admission, serum creatinine, procalcitonin, pH, lactate, NLR, Apache II scores, GCS values.

Earthquakes are sudden natural disasters that can cause major destruction and loss of lives (5). The Kahramanmaraş centered earthquakes were among the strongest earthquakes in the 21st century causing more than 50.000 deaths and 119.000 injuries (8).

Disel et al evaluated the mortality related factors detected in trauma patients admitted to the emergency department after Kahramanmaraş centered earthquakes. They reported that they determined no statistically significant difference in terms of age and gender of the earthquake victims who survived and died. They reported that higher emergence hemodialysis requirement and lower serum calcium, lower base excess and lower pH levels were observed in the non-survivor group (9). Like their study, our study results revealed that there was no statistically significant difference between genders and mortality and also, we found lower Ph levels in the non-survivor group.

Qi et al investigated 72-h mortality in trauma patients by using the base excess, lactate and pH values of arterial blood gas analysis on admission. They reported that the prognostic value of these three parameters was as follows : lactate > BE > pH (10). Like their study, we evaluated lactate and Ph of the blood gas on admission, and we observed that high lactate levels and low pH levels had predictive value on mortality. Their study differed from ours in that they investigated 72-hour mortality in adult polytrauma patients with a large sample size.

Pan et al analyzed 2016 Taiwan earthquake for earthquake related mortality. They evaluated the victims of the earthquakes according to their age definitions as: preschool (under 5 years), school (5-14 years), adult (18-64 years) and elderly (above 64 years). They found that there was a strong association between the time for extrication and earthquake related mortality in their study. They also reported that the elderly group had the highest earthquake related mortality rate (11). Unlike them, we did not assign the earthquake victims into groups according to their ages in our study. Also, we found no statistically significant difference between survivors and non-survivors in terms of age in our study.

Hu et al investigated the early and rapid factors of in-hospital mortality of older adults (aged ≥65 years old) earthquake trauma patients. They analyzed the records of 7308 patients from West China Earthquake Patients Database. They reported that 10 factors were related to in-hospital mortality. These factors were: age, mean arterial pressure, pulse rate, comorbidities such as deep vein thrombosis, coronary heart disease, chronic kidney disease, dementia and malignant tumor, GCS and Triage Revised Trauma Score (12). This study differs from our study in terms of patient population because the earthquake victims participating in this study were only older adults. In our study, we determined GCS as a common mortality determinant with this study.

It was not surprising that higher rates of intubation at the time of admission were found to be associated with earthquake inpatient death in our study as critically ill trauma patients are commonly intubated and admitted to the ICU.

APACHE is one of the predictive scoring systems in the ICU by using the worst physiological values measured within the patient's first 24 hours of admission to the ICU. Higher scores are related to severe disease and higher risk of mortality. Godinjak et al compared APACHE II scoring system and Simplified Acute Physiology Score II (SAPS II) scoring system for patient outcomes in the ICU. They reported that APACHE II score higher than 27.5 can predict the mortality of patients in the ICU with 93.4 % specificity and 74.5% sensitivity (13). In our study, the cut-off value for Apache II was >29 with the sensitivity of 95% and the specificity of 56%. APACHE II scores were 29.8 ± 12.4 in the survivor group and were 41. 6 ± 11.1 in the non-survivor group.

Dilektasli et al investigated the NLR and mortality relationship in critically ill trauma patients. They calculated the NLR for each day in the ICU. They reported that the NLR value on the first day of hospitalization was not useful for outcome prediction but on the 2nd and 5th day of hospitalization the elevation in NLR was independently associated with increased mortality (14). We recorded the NLR only on admission to the ICU. Unlike their study, we found that the lower NLR was found to be related with increased mortality in our study.

Crush syndrome developing after an earthquake has a lethal but reversible complication: Crush related acute kidney injury. Erek et al investigated the morbidity and mortality of a total of 639 patients with crush injury related acute renal failure following 1999 earthquake in the Marmara region, Turkey. They reported that oliguria, hyperkalemia, hyperphosphatemia, hypocalcemia, high creatinine levels and high creatinine phosphokinase levels were the most important clinical findings that were observed. They reported that among 639 patients, 477 patients were dialyzed, and 162 patients were not dialyzed. A total of 97 patients died. Mortality rates were 17.2% (82 of 477) in dialyzed patients and 9.3% (15 of 162) in non-dialyzed patients (15). In our study, among 45 patients,19 patients were dialyzed. 45% of the deceased patients received dialysis and 55 % did not receive dialysis. And also, higher creatinine levels were found to be associated with increased mortality.

Procalcitonin is an acute phase reactant. The serum level of procalcitonin rises in both response to microbial infections and in severe trauma (16,17). The relationship between procalcitonin and lactate levels was associated with meaningful predictive outcomes in a retrospective study that was carried out on pediatric trauma patients (18). Our study findings confirmed the important role of both procalcitonin and lactate levels in predicting mortality.

Our study had some limitations. Due to lack of data of the patient's prior major diseases before the earthquake, the contribution of patient comorbidities to death could not be investigated. Another limitation is rescuing times and injuries of the victims were not investigated for predicting earthquake inpatient death. Serum creatinine kinase levels could have been included among the laboratory parameters in the study, but since the serum creatinine kinase level was not measured in every patient, it could not be evaluated. The single-center nature and small sample size are the other limitations of the study.

In conclusion, earthquakes are life- threatening natural disasters. The definition of the clinical and laboratory parameters of the earthquake victims is crucial in assessing mortality risks. Intubated status on admission, the levels of serum creatinine, procalcitonin, lactate, Ph and NLR, the scores of Apache II and GCS might be valuable in predicting survival status following major destructive earthquakes.

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Global Shifts and Emerging Themes in Parkinson's Disease Rehabilitation: A Comprehensive 30-Year Bibliometric Analysis

Parkinson Hastalığı Rehabilitasyonunda Küresel Değişimler ve Ortaya Çıkan Temalar: 30 Yıllık Kapsamlı Bir Bibliyometrik Analiz

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Abstract: The aim of this bibliometric study was to analyze the global research landscape in Parkinson's disease (PD) rehabilitation from 1995 to 2024. The present study employed a bibliometric analysis, leveraging the Web of Science (WoS) database, to identify publications on "Parkinson's Disease rehabilitation" from January 1995 to January 2024. The top 100 (T100) highest-cited articles were identified through a meticulous examination of citation frequency. Extracted data included publication year, journal name, citation count, authorship, study type, and regional contributions. Trends in publication frequency were analyzed using linear and quadratic regression models, while Spearman's rank correlation assessed relationships between total and annual citations. The Archives of Physical Medicine and Rehabilitation contributed the most articles (n=13). Highly cited studies focused on exercise interventions, virtual reality, and community-based rehabilitation, with the top article receiving 244 citations. The United States was the leading contributor, while Nieuwboer A. and Rochester L. were the most prolific authors. Publication frequency showed non-linear growth, peaking around 2015 and slightly declining thereafter. A moderate positive correlation (r = 0.59) between total citations and annual citations reflected the sustained impact of influential works. This analysis highlights key contributors, research trends, and global collaboration in PD rehabilitation. Future studies should focus on cost-effective, scalable interventions and longitudinal evaluations of emerging therapies to improve patient outcomes.
Keywords: Bibliometric analysis, parkinson disease, rehabilitation, web of science

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Informed Consent: The authors declared that informed consent form was signed by the participants.
Authorship Contributions: Conception: B, OF; B, F- Design: B, OF; B, F- Supervision: B, F- Fundings: None -Materials: B, OF; B, F- Data Collection and/or Processing: B, OF; B, F- Analysis and/or Interpretation: B, OF; B, F- Literature: B, OF- Review: B, OF- Writing: B, OF- Critical Review: B, OF; B, F
Copyright Transfer Form: Copyright Transfer Formwas signed by all authors.
Conflict of Interest: No conflict of interest was declared by the authors.
Financial Disclosure: The authors declared that this study received no financial support.

Özet: Bu bibliyometrik çalışmanın amacı, 1995'ten 2024'e kadar Parkinson hastalığı (PH) rehabilitasyonundaki küresel araştırma ortamını analiz etmektir. Bu çalışmada, Ocak 1995'ten Ocak 2024'e kadar "Parkinson Hastalığı rehabilitasyonu" ile ilgili yayınları belirlemek için Web of Science (WoS) veri tabanından yararlanılarak bibliyometrik bir analiz yapılmıştır. En çok atıf alan ilk 100 (İ100) makale, titiz bir atıf sıklığı incelemesiyle belirlenmiştir. Elde edilen veriler arasında yayın yılı, dergi adı, atıf sayısı, yazarlık, çalışma türü ve bölgesel katkılar yer almıştır. Yayın sıklığındaki eğilimler doğrusal ve ikinci dereceden regresyon modelleri kullanılarak analiz edilirken, Spearman'ın sıra korelasyonu toplam ve yıllık atıflar arasındaki ilişkileri değerlendirdi. The Archives of Physical Medicine and Rehabilitation en fazla makaleye katkıda bulunmuştur (n=13). En çok atıf alan çalışmalar egzersiz müdahaleleri, sanal gerçeklik ve toplum temelli rehabilitasyon konularına odaklanırken, en çok atıf alan makale 244 atıf almıştır. Amerika Birleşik Devletleri en çok katkıda bulunan ülke olurken, Nieuwboer A. ve Rochester L. en üretken yazarlar olmuştur. Yayın sıklığı doğrusal olmayan bir büyüme göstermiş, 2015 yılı civarında zirve yapmış ve sonrasında hafifçe düşmüştür. Toplam atıflar ile yıllık atıflar arasındaki ılımlı pozitif korelasyon (r = 0,59), etkili çalışmaların sürdürülebilir etkisini yansıtmaktadır. Bu analiz, PH rehabilitasyonuna katkıda bulunan önemli kişileri, araştırma eğilimlerini ve küresel iş birliğini vurgulamaktadır. Gelecekteki çalışmalar, hasta sonuçlarını iyileştirmek için maliyet etkin, ölçeklenebilir müdahalelere ve yeni ortaya çıkan tedavilerin uzunlamasına değerlendirmelerine odaklanmalıdır.
Anahtar Kelimeler: Bibliyometrik analiz, parkinson hastalığı, rehabilitasyon, web of science

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1. Introduction

Aging is considered a significant risk factor for neurodegenerative diseases, with an increasing prevalence of these conditions observed in ageing populations (1). Parkinson's Disease (PD) is the second most prevalent neurodegenerative disorder worldwide, affecting approximately 1% of individuals over the age of 60 (2). PD is typified by a range of motor symptoms, including bradykinesia, tremor, rigidity, and postural instability, as well as non-motor symptoms such as cognitive impairment, mood disturbances, and autonomic dysfunction (3). These symptoms have a markedly deleterious impact on patients' functional independence and quality of life, underscoring the imperative for comprehensive rehabilitative interventions (4).

The role of rehabilitation in PD has expanded considerably in recent years, as traditional pharmacological treatments, while efficacious in symptom management, are unable to impede disease progression (5). The value of multimodal rehabilitation approaches has grown, encompassing physical therapy, occupational therapy, speech and language therapy, and neuropsychological support. These approaches target specific PD symptoms and improve overall patient outcomes (6, 7).

Over the past two decades, there has been a notable shift towards the utilisation of advanced technology in rehabilitation. This has encompassed the integration of robotics, virtual reality (VR), wearable devices and non-invasive brain stimulation as adjunctive therapies to conventional rehabilitation practices (8). The use of robotic-assisted rehabilitation has gained significant attention as a potential means of enhancing motor recovery through the administration of repetitive, task-specific exercises that promote neuroplasticity and functional improvements (9). A number of studies have demonstrated that robotic-assisted gait training, upper limb robotics, and exoskeletons can facilitate improvements in motor function and mobility in patients with PD (10, 11). Furthermore, VR-based rehabilitation has demonstrated efficacy in addressing both motor and cognitive impairments by engaging patients in immersive environments that encourage movement and improve balance, cognitive function, and coordination (12).

These developments reflect a broader trend in PD rehabilitation research, characterised by an increasing interdisciplinary collaboration among neuroscientists, engineers, and rehabilitation professionals. Notwithstanding the expanding corpus of research, considerable obstacles persist in facilitating the accessibility and cost-effectiveness of these sophisticated interventions, particularly in lower-income settings (13). Furthermore, the absence of long-term data assessing the sustained effects of technology-based rehabilitation represents a significant gap in the current research landscape (14).

Over the past decades, numerous studies have laid the foundations for understanding and treating PD through rehabilitation (15-17). However, a comprehensive evaluation of the specific contributions from different countries, institutions and authors, as well as an analysis of current research hotspots and trends, remains a challenge.

Bibliometrics, first introduced in 1969, addresses this need by applying statistical and mathematical techniques to quantitatively evaluate the literature, helping to identify influential contributors, emerging trends and critical issues in research fields (18, 19).

This study applies bibliometric analysis to explore the landscape of PD rehabilitation research over the past 30 years. By systematically examining contributions from key countries, institutions and authors, this analysis provides valuable insights into current research directions, highlights gaps requiring further investigation and anticipates future trends. The findings are intended to support the evidence-based advancement of PD rehabilitation research and inform the development of clinical guidelines.

2. Materials and Method

A detailed bibliometric study was conducted to systematically examine trends and contributions in PD rehabilitation research. The study analyzed the literature from January 1995 to January 2024. The Web of Science (WoS) database was selected as the primary source for data collection. A title-specific search was conducted in December 2024 using the key term “Parkinson's Disease rehabilitation”. This phrase was chosen based on preliminary searches which showed that broader terms such as 'physical therapy', 'motor recovery', or 'exercise' led to the retrieval of many irrelevant results. Therefore, a more specific phrase was selected to ensure the inclusion of directly relevant studies. The WoS database was selected to enable a comprehensive search of the publications that make up the field, thus providing the basis for quantitative bibliometric evaluation and trend analysis.

Three independent reviewers performed the search, evaluation and data extraction to ensure the reliability of the methodology. Articles were carefully reviewed to confirm relevance to PD rehabilitation, specifically focusing on studies addressing physical, cognitive, and technological interventions. Articles were then curated in descending order of citation frequency, highlighting the most frequently cited and thus potentially most influential publications within the PD rehabilitation literature. It should be noted that this particular analysis was not subject to any ethical approval or informed consent requirements, as it exclusively relied on published research data and did not involve human or animal subjects.

The data extraction process entailed the retrieval of pertinent information from the selected literature, comprising publication information (such as the title, authors, year of publication journal), study design (such as randomized controlled trial, research article or systematic review), and bibliometric indicators (such as impact factor, H-index, quartile classification). The annual citation rate (Citations per Year, CI) was calculated by dividing the total citations (TC) through the number of years since publication. The journals that contributed to the top-cited articles were classified according to their quartile rankings (Q1-Q3) based on their impact factor and H-index, with a particular emphasis on those with a high impact factor. Additionally, the geographic distribution of article contributions and individual author productivity were analyzed to identify the leading countries and researchers in the field.

The application of descriptive statistics was instrumental in the summary of the characteristics of the included articles, journals, authors, and countries**.** Continuous variables, such as TC and CI, were expressed as median and range (min–max) due to the non-normal distribution of citation data. Categorical variables, such as study type, journal quartile ranking, and country of contribution, were expressed as frequency and percentage (n, %). The Shapiro-Wilk test was employed for the purpose of evaluating the normality of continuous variables. In instances where the variables were non-normal, Spearman's rank correlation analysis was implemented for the purpose of assessing the relationships between total citations, average citations per year, and year of publication. Regression analyses (linear and quadratic) were employed to identify trends in publication frequency over time, as well as relationships between total citations and average annual citations. The selection of these models was based on preliminary scatterplot inspections suggesting a curvilinear pattern. Model fit was assessed using the R^2 coefficient of determination. The p value was considered to be statistically significant if it was less than 0.05. All statistical analyses were performed employing IBM SPSS Statistics, version 22.0.

3. Results

Figure 1 displays the trajectory of Parkinson's rehabilitation-related publications over time, with analysis conducted using linear and quadratic regression models. The data indicate a gradual increase in the frequency of publications from 1995 to approximately 2015, followed by a slight decline in recent years. The higher R^2 value for the quadratic model suggests that research activity in Parkinson's rehabilitation grew in a nonlinear manner, with rapid increases during the early 2000s, potentially reflecting the emergence of interest in innovative rehabilitation approaches, such as exercise-based interventions and virtual reality. The decline observed after 2015 may be attributable to a shift in research priorities or a degree of saturation in specific research domains.

Figure 2 shows the annual citation frequency for articles on Parkinson's rehabilitation covering the period from 1995 to 2024. The data reveals a significant increase in citations over the period examined, highlighting the expanding impact and importance of research in this field. The first growth period is defined as the period between 1995 and 2010. The gradual increase in citations during this period indicates a consistent increase in basic research in the field of Parkinson's rehabilitation. The next period, 2010-2020, is characterized by an accelerated growth phase. A significant increase in citations occurred after 2010, peaking around 2020. This period likely reflects the proliferation of highly impactful studies, including randomized controlled trials and systematic reviews, as well as advances in therapeutic modalities such as exercise interventions and virtual reality applications. The recent decline in citations (post-2020) might be ascribed to a variety of reasons, comprising the publication of fewer high-impact studies, shifts in research focus, or the effects of the global pandemic, which may have temporarily impacted research dissemination.

Figure 3 presents a scatter plot that examines the relationship between the total number of citations and the average number of citations per year for articles on Parkinson's rehabilitation. The data indicate a positive correlation, suggesting that articles with a higher total citation count tend to maintain a higher annual citation rate. The red line represents the best-fit linear regression model. The R-squared value is 0.59, indicating that 59% of the

variation in average annual citations can be explained by the total number of citations. The moderate to strong correlation serves to underscore the persistent and long-term impact of highly cited articles. The majority of articles exhibit a low citation range, with a total number of citations below 100 and an annual average of less than 10. This observation reflects the prevalence of low-impact studies in the field. However, a few outliers with high total and annual citation rates (e.g., total citations >200, annual average >15) indicate extraordinary impact in the field. The shaded region around the regression line represents the confidence interval, indicating variability in the observed data. It should be noted that papers with similar TC may differ in annual rates due to factors such as year of publication or relevance.

Figure 4 (a) illustrates the distribution of contributions to T100 articles by country. In alignment with global research endeavors in the domain of Parkinson's rehabilitation, the United States emerges as the foremost contributor, trailed by Italy and the United Kingdom. Figure 4 (b) illuminates the individual authors who have made the most significant contributions to T100 articles. Author Nieuwboer A. leads the list with seven papers, followed by Author Rochester L., who has contributed six papers, underscoring their substantial influence and expertise in this field.

Table 1 presents the distribution of T100 articles by journal. The Archives of Physical Medicine and Rehabilitation leads with 13 articles, followed by Neurorehabilitation and Neural Repair and Movement Disorders, each contributing 6 articles. The highest impact factor (IF) is 8.8 for the Cochrane Database of Systematic Reviews and 7.7 for Neurology. The H-index, which indicates the quality of a journal's research and its impact on citations, is highest for Neurology (411) and Movement Disorders (229). While most of the journals are classified as Q1, which reflects their top-tier status, contributions also come from Q2 and Q3 journals.

The top 20 articles included randomized controlled trials (RCTs), systematic reviews, and research articles. The studies most frequently cited were those conducted by Duncan et al. (2012) and Troche et al. (2010), which focused on community-based dance and swallowing rehabilitation. These studies were cited a total of 244 times. The article by Dockx et al. (2016) exhibited the highest annual citation rate (26.12), wherein the authors examined the potential of VR for rehabilitation purposes. Additionally, exercise interventions were a prominent feature of the literature, as evidenced by studies conducted by Tajiri et al. (2010) (TC: 220) and Schenkman et al. (2012) (TC: 154). Other studies explored novel treatments, such as VR and rhythmic sensory stimulation, and emphasized innovation in treatment approaches (Table 2). Descriptive statistics for the top 20 most cited papers reveal a median total citation count of 160.0 (range: 120-244) and a median annual citation rate of 11.05 (range: 5.21-26.12).

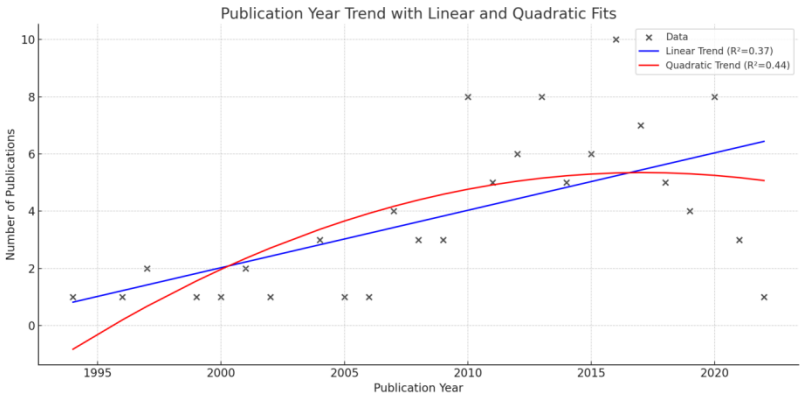


Figure 1. Trend in publication years with linear and quadratic fits (The quadratic model demonstrated a better fit (higher R^2) compared to the linear model, suggesting that the trend in publication frequency was not purely linear but exhibited a growth-peak-decline pattern)

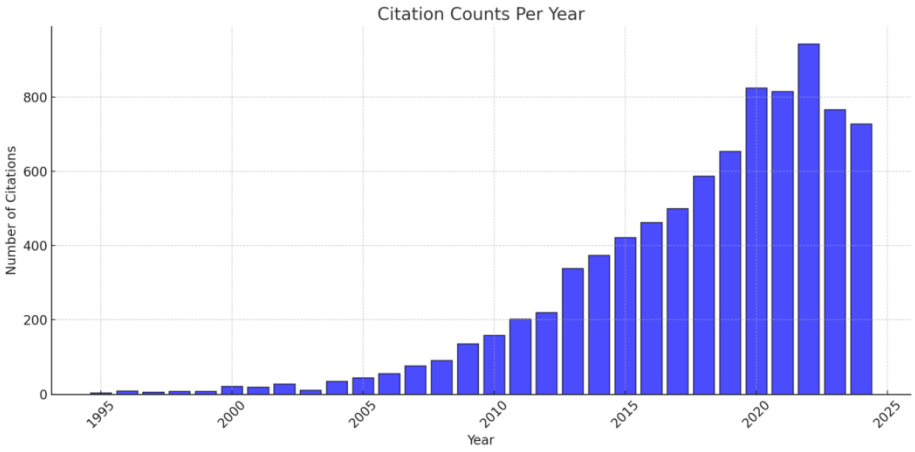


Figure 2. Citation Counts Per Year

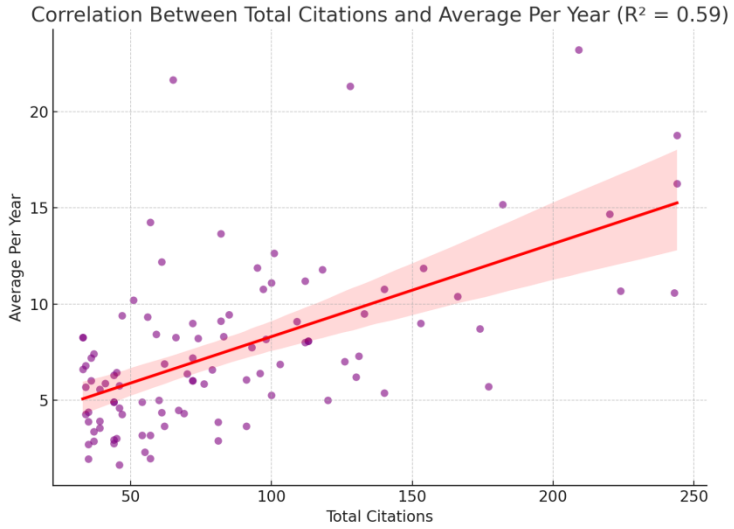
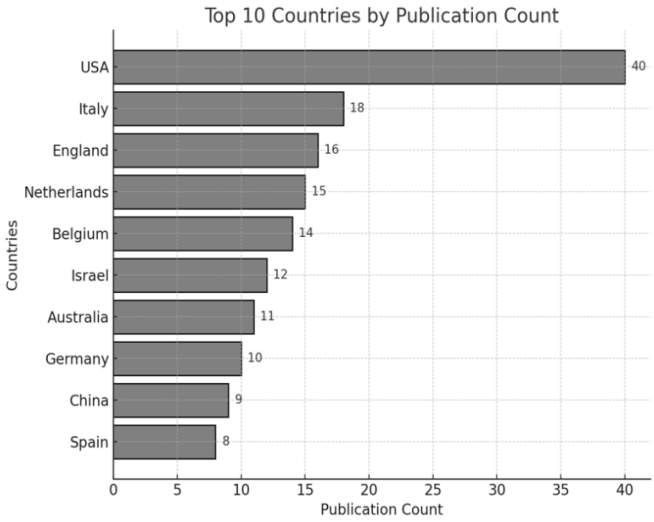


Figure 3. Correlation Between Total Citations and Average Per Year (The coefficient of determination ($R^2 = 0.59$) indicates that 59% of the variability in average annual citations can be explained by total citations. This suggests a moderately strong relationship between citation volume and long-term impact)



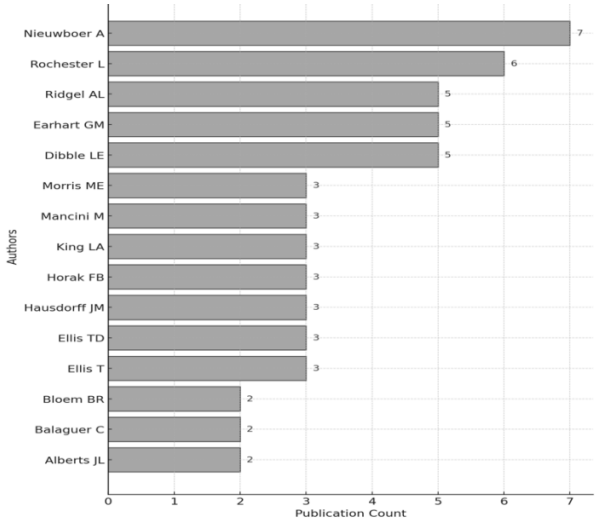


Figure 4. Number of contributions to T100 articles according to: a) countries and b) authors.

Table 1. Journals with T100 articles, ranked according to >2 times cited

Journal name	Number of articles	IF	H - Index	Q Classification
ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION	13	3.6	216	Q1
NEUROREHABILITATION AND NEURAL REPAIR	6	3.7	128	Q1
MOVEMENT DISORDERS	6	7.4	229	Q1
PHYSICAL THERAPY	5	3.5	176	Q1
FRONTIERS IN NEUROLOGY	5	2.7	105	Q3
PARKINSONISM & RELATED DISORDERS	5	3.1	122	Q2
JOURNAL OF NEUROENGINEERING AND REHABILITATION	4	5.2	120	Q1
AMERICAN JOURNAL OF PHYSICAL MEDICINE & REHABILITATION	3	2.2	117	Q2
NEUROREHABILITATION	3	1.7	78	Q2
JOURNAL OF REHABILITATION RESEARCH AND DEVELOPMENT	3	1.04	121	Q1
NEUROLOGY	2	7.7	411	Q1
COCHRANE DATABASE OF SYSTEMATIC REVIEWS	2	8.8	327	Q1
JOURNAL OF NEUROLOGIC PHYSICAL THERAPY	2	2.6	64	Q1
NEUROSCIENCE AND BIOBEHAVIORAL REVIEWS	2	7.5	288	Q1
NEUROLOGICAL SCIENCES	2	2.7	87	Q1
FUNCTIONAL NEUROLOGY	2	1.27	49	Q3
JOURNAL OF AGING AND PHYSICAL ACTIVITY	2	1.4	69	Q3
CLINICAL REHABILITATION	2	2.6	125	Q1
JOURNAL OF PARKINSONS DISEASE	2	4	68	Q2

Table 2. General information related to the top 20 articles on parkinson rehabilitation

Title	Authors	Source Title	PY	TC	CI	AT
1-Randomized Controlled Trial of Community-Based Dancing to Modify Disease Progression in Parkinson Disease	Duncan et al.	NEUROREHABILITATION AND NEURAL REPAIR	2012	244	20.33	Randomized Controlled Trial
2-Aspiration and swallowing in Parkinson disease and rehabilitation with EMST A randomized trial	Troche et al.	NEUROLOGY	2010	244	17.42	Randomized Controlled Trial
3-The power of cueing to circumvent dopamine deficits: A review of physical therapy treatment of gait disturbances in Parkinson's disease	Rubinstein et al.	MOVEMENT DISORDERS	2002	243	11.04	Review
4-Attending to the task: Interference effects of functional tasks on walking in Parkinson's disease and the roles of cognition, depression, fatigue, and balance	Rochester et al.	ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION	2004	224	11.20	Controlled Clinical Trial
5-Exercise exerts neuroprotective effects on Parkinson's disease model of rats	Tajiri et al.	BRAIN RESEARCH	2010	220	15.71	Research Article
6-Virtual reality for rehabilitation in Parkinson's disease	Dockx et al.	COCHRANE DATABASE OF SYSTEMATIC REVIEWS	2016	209	26.12	Systematic Review
7-Treadmill exercise elevates striatal dopamine D2 receptor binding potential in patients with early Parkinson's disease	Fisher et al.	NEUROREPORT	2013	182	16.54	Randomized Controlled Trial
8-PHYSICAL THERAPY AND PARKINSONS-DISEASE - A CONTROLLED CLINICAL-TRIAL	COMELLA et al.	NEUROLOGY	1994	177	5.9	Controlled Clinical Trial
9-The effect of external rhythmic cues (auditory and visual) on walking during a functional task in homes of people with Parkinson's disease	Rochester et al.	ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION	2005	174	9.15	Research Article
10-The Effects of Exercise on Balance in Persons with Parkinson's Disease: A Systematic Review Across the Disability Spectrum	Dibble et al.	JOURNAL OF NEUROLOGIC PHYSICAL THERAPY	2009	166	11.06	Systematic Review
11-Exercise for People in Early- or Mid-Stage Parkinson Disease: A 16-Month Randomized Controlled Trial	Schenkman et al.	PHYSICAL THERAPY	2012	154	12.83	Randomized Controlled Trial
12-Effects of rhythmic sensory stimulation (auditory, visual) on gait in Parkinson's disease patients	Arias et al.	EXPERIMENTAL BRAIN RESEARCH	2008	153	9.56	Research Article
13-Motor learning, retention and transfer after virtual-reality-based training in Parkinson's disease - effect of motor and cognitive demands of games: a longitudinal, controlled clinical study	dos Santos Mendes et al.	PHYSIOTHERAPY	2012	140	11.66	Controlled Clinical Trial
14-Identification of axial rigidity during locomotion in Parkinson disease	Van Emmerik et al.	ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION	1999	140	5.6	Research Article
15-It Is Not About the Bike, It Is About the Pedaling: Forced Exercise and Parkinson's Disease	Alberts et al.	EXERCISE AND SPORT SCIENCES REVIEWS	2011	133	10.23	Review
16-Integration of motor imagery and physical practice in group treatment applied to subjects with Parkinson's disease	Tamir et al.	NEUROREHABILITATION AND NEURAL REPAIR	2007	131	7.70	Controlled Clinical Trial
17-Role of sensory input and muscle strength in maintenance of balance gait and posture in Parkinson's disease - A pilot study	Nallegowda et al.	AMERICAN JOURNAL OF PHYSICAL MEDICINE & REHABILITATION	2004	130	6.5	Research Article
18-Effects of virtual reality rehabilitation training on gait and balance in patients with Parkinson's disease: A systematic review	Lei et al.	PLOS ONE	2019	128	25.6	Systematic Review
19-The immediate effect of attentional, auditory, and a combined cue strategy on gait during single and dual tasks in Parkinson's disease	Baker et al.	ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION	2007	126	7.41	Controlled Clinical Trial
20-Resistance training and gait function in patients with Parkinson's disease	Scandalis et al.	AMERICAN JOURNAL OF PHYSICAL MEDICINE & REHABILITATION	2001	120	5.21	Research Article

IF: Impact factor,

H-Index: Hirsch Index, Q Classification: Quarter classification of Journal

PY: Publication year, TC: Total citations, CI: Citation index, AT: Article type

4. Discussion

Bibliometric analysis is a foundational methodology for deciphering the intricacies of scientific research environments. Through the quantitative assessment of patterns in publication output, citation impact, and thematic evolution, bibliometrics serves as a potent instrument for accentuating influential contributors, emerging trends, and under-explored areas of research (18).

In the domain of PD rehabilitation, marked by rapid technological advancements and multidisciplinary innovations, bibliometric insights are indispensable. These insights provide a retrospective assessment of progress and identify pathways for future discoveries and global collaboration. Spanning nearly three decades of research, this bibliometric study provides a powerful analysis of the evolution of PD rehabilitation. The findings reveal a dynamic interplay of innovation, collaboration and ongoing challenges and provide a comprehensive framework for understanding the trajectory of this critical field.

The observed correlation between total and annual citation rates implies that highly cited articles maintain consistent scholarly influence over time. This may reflect the foundational nature or widespread applicability of these studies, which continue to be referenced regardless of publication year.

The United States has emerged as the top contributor to PH rehabilitation research, supported by strong funding sources, advanced academic infrastructure, and an understanding of interdisciplinary collaboration (2, 4), while Italy and the United Kingdom have also made significant contributions, reflecting the global nature of efforts to advance rehabilitation. Researchers such as Nieuwboer and Rochester have made significant contributions to the field of motor rehabilitation and provided foundational knowledge that continues to inform evidence-based clinical practice (20, 21). The role of leading academic journals such as Archives of Physical Medicine and Rehabilitation, Neurorehabilitation and Neural Repair and Movement Disorders has been instrumental in the dissemination of high quality research findings. These journals not only increase the visibility of influential studies, but also serve as conduits for integrating the latest findings into clinical practice (22).

The preponderance of Q1-ranked journals among the most cited articles serves to emphasize the rigorous academic standards and relevance of PD rehabilitation research to evidence-based medicine. The integration of advanced technologies into PD rehabilitation represents a paradigm shift that is redefining the scope and impact of therapeutic interventions. VR exemplifies this transformation by offering immersive environments that promote motor and cognitive recovery through neuroplasticity and patient engagement (9). Robotics-assisted therapies have become an integral part of advancing motor recovery by providing measurable and reproducible outcomes due to their precision, consistency and task specificity (10). Wearables and tele-rehabilitation platforms represent another frontier in technological advancement by increasing accessibility and enabling real-time monitoring of patient progress. These technologies are particularly valuable for extending care to remote and underserved populations, filling gaps in healthcare access and equity (23). Collectively, these innovations mark a shift towards personalized, data-driven care, aligning rehabilitation strategies with the principles of precision medicine. Exercise-based interventions remain fundamental, with new approaches such as community-based dance therapy and rhythmic sensory stimulation addressing not only motor impairments but also emotional well-being and social connectedness (24, 25). These holistic strategies emphasize the multidimensional nature of rehabilitation, going beyond physical restoration to include psychological and social health. Despite the notable advancements in the field, significant barriers persist. Accessibility remains a critical issue; the high costs of technologies such as VR and robotics limit their widespread adoption, particularly in low- and middle-income countries (26). Addressing these inequalities necessitates scalable, cost-effective solutions that provide equal access to high-quality rehabilitation. Another notable shortcoming is the limited availability of longitudinal data assessing the sustainable impact of new interventions.

While short-term benefits are well-documented, the long-term efficacy of technologies such as VR and robotics on motor recovery, quality of life, and neurodegenerative progression has not been adequately investigated (12). Addressing this gap with robust longitudinal research will provide the necessary evidence to inform comprehensive

clinical guidelines.

The observed peak in publication activity around 2015, followed by a mild decline, may reflect thematic saturation in traditional rehabilitation approaches. During the 2005–2015 period, intensive research on physiotherapy, gait training, and exercise-based interventions reached maturity. Subsequently, the focus of scientific interest may have shifted toward emerging areas such as telerehabilitation, wearable technologies, and artificial intelligence (AI) supported therapy, which may not always be indexed under traditional 'Parkinson's Disease rehabilitation' keywords (23, 27). One such area that has seen significant growth in recent years is the integration of AI and machine learning in rehabilitation (3). The application of AI in rehabilitation has the potential to transform the field environment by personalizing interventions, predicting patient outcomes and improving the efficiency of rehabilitation delivery.

The decline in citation counts after 2020 may also be partially attributed to the COVID-19 pandemic, which disrupted non-urgent clinical research worldwide and affected dissemination and publication cycles (28).

While this bibliometric study offers valuable insights into global research trends in PD rehabilitation, it is important to note that it is not without its limitations. First, the study's exclusive reliance on the WoS database may have resulted in the omission of relevant publications indexed in other databases, such as PubMed or Scopus. This limitation reduces the study's overall comprehensiveness. Second, the study's emphasis on citation criteria introduces a form of citation bias, as highly cited studies may not always represent the most clinically relevant or methodologically rigorous research. Ultimately, the emphasis on the top 100 most cited articles may result in the exclusion of significant yet less frequently cited studies, particularly those that pertain to novel or specialized research domains that have not yet garnered substantial citations. These limitations underscore the necessity for a more extensive and inclusive approach in subsequent bibliometric analyses.

Future bibliometric studies should consider integrating multiple databases (such as Scopus, PubMed) to improve comprehensiveness. Moreover, the use of natural language processing and AI assisted classification methods may enhance the sensitivity and specificity of search strategies. In addition to citation counts, future analyses should incorporate quality-based metrics such as levels of evidence, clinical applicability, and innovation potential to provide a more holistic assessment of scientific impact.

5. Conclusion

This study constitutes a landmark effort to conduct a bibliometric analysis of the research landscape in PD rehabilitation. The results indicate that as academics focus on PD rehabilitation, insights into disease mechanisms and therapeutic innovations will deepen significantly. Future research is expected to increasingly utilize advanced technologies to improve treatment classifications and methodologies. This analysis serves as a critical resource for researchers seeking strategic partnerships by facilitating collaborative initiatives that will shape the future of evidence-based PH rehabilitation practice and improve patient care outcomes.

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Effect of Body Composition and Hamstring Flexibility on Closed Kinetic Chain Lower Extremity Stability in Young Adults: A Cross-sectional Study

Genç Erişkinlerde Vücut Kompozisyonu ve Hamstring Esnekliğinin Kapalı Kinetik Zincir Alt Ekstremite Stabilitesi Üzerine Etkisi: Kesitsel Bir Çalışma

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Abstract: The kinetic chain refers to the coordination of segments of the body for holistic movement; its assessment and enhancement have the potential to improve sports performance and reduce the risk of injury. This study aims to explore the relationship between body composition, hamstring flexibility, and closed kinetic chain lower extremity stability. A total of 92 young adults who were uninjured and exhibited a moderate level of physical activity were the subjects of a series of tests designed to ascertain their body composition using bioimpedance analysis, hamstring flexibility using the sit-and-reach test, and lower extremity kinetic chain function using the closed kinetic chain lower extremity stability test (CKCLEST). An analysis revealed no discernible relationship between the CKCLEST test score and body composition measurements or sit-and-reach test scores, with a statistical significance level of $p<0.05$. It is important to recognise that factors such as body composition and flexibility may not directly influence CKCLEST results. The findings of this study are anticipated to facilitate a more efficacious utilisation of CKCLEST in clinical practice and a more profound comprehension of its potential benefits.
Keywords: Body composition, Closed kinetic chain, Flexibility, Lower extremity, Physical activity.

Özet: Kinetik zincir, bütünsel hareketler için vücut segmentlerinin koordinasyonunu ifade eder; değerlendirilmesi ve geliştirilmesi spor performansını iyileştirme ve yaralanma riskini azaltma potansiyeline sahiptir. Bu çalışma, vücut kompozisyonu, hamstring esnekliği ve kapalı kinetik zincir alt ekstremite stabilitesi arasındaki ilişkiyi araştırmayı amaçlamaktadır. Yaralanmamış ve orta düzeyde fiziksel aktivite düzeyine sahip toplam 92 genç yetişkine, vücut kompozisyonlarını değerlendirmek için biyoimpedans analizi, hamstring esnekliğini değerlendirmek için otur-eriş testi ve alt ekstremite kinetik zincir fonksiyonunu belirlemek için kapalı kinetik zincir alt ekstremite stabilite testi (CKCLEST) uygulanmıştır. Yapılan analizler sonucunda, $p<0,05$ istatistiksel anlamlılık düzeyi ile, CKCLEST test puanıyla vücut kompozisyonu ölçümleri veya otur-eriş test skorları arasında önemli bir ilişki olmadığı görülmüştür. Vücut kompozisyonu ve esneklik gibi faktörlerin, CKCLEST sonuçlarını doğrudan etkilemeyebileceğinin akılda tutulması önemlidir. Bu çalışmanın bulgularının, CKCLEST'in klinik uygulamada daha etkili bir şekilde kullanılması ve potansiyel faydalarının daha derinlemesine anlaşılmasını kolaylaştırması beklenmektedir.
Anahtar Kelimeler: Vücut bileşimi, Kapalı kinetik zincir, Esneklik, Alt ekstremite, Fiziksel aktivite.

Ethics Committee Approval: The study was approved by Trakya University Noninterventional Clinical Research Ethical Committee (TÜTF-GOBAEK 14/07 02.09.2024).

Informed Consent: The author declared that informed consent was obtained from the participants in the study.

Authorship Contributions Concept, data collection, processing, analysis, interpretation, literature search, writing: HÖ.

Copyright Transfer Form: Copyright Transfer Formwas signed by all authors.

Conflict of Interest: No conflict of interest was declared by the authors.

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1. Introduction

The kinetic chain refers to the coordinated activation of extremity muscles to perform activities requiring flexibility, strength, proprioception, and endurance (1). In closed kinetic chain activity, the terminal joint encounters resistance, restricting free movement, while open kinetic chain activity allows the terminal joint to move freely (2). Muscle activation patterns generate segment movements and positions, with length-dependent patterns controlling joint distortions and force-dependent patterns harmonizing movements across multiple joints. These patterns create stability and allow for voluntary muscle activity (3).

The realization that closed kinetic chain exercises can enhance dynamic stability via approximation and co-contraction of joints, as well as the resulting compression, has led to a notable rise in the incorporation of such activities into clinical rehabilitative regimens. Moreover, it has prompted the notion that the evaluation of stability via closed kinetic chain activities may elucidate whether patients are prepared to resume their activities or if they require additional rehabilitation (4).

The Closed Kinetic Chain Lower Extremity Stability Test (CKCLEST) is a performance-based assessment that provides quantitative data for evaluating lower extremity stability in closed kinetic chains. It is a practical and economical tool that can be utilised in both clinical and sports settings. The test involves quantifying the number of times subjects make contact with their opposite foot to the outside diagonal of the other foot in a closed kinetic chain position (push-ups), alternating with three trials for 15 seconds (5).

Research shows that a higher body mass index (BMI) is negatively correlated with hamstring flexibility, indicating that increased body fat may hinder muscle flexibility (6). Additionally, greater hamstring flexibility is linked to improved dynamic stability in the lower extremities during closed kinetic chain exercises, which are considered more effective than open kinetic chain exercises for enhancing balance and stability (7). Given these relationships, there is a pressing need for further research to investigate how body composition, hamstring flexibility, and closed kinetic chain stability are interconnected, particularly across different populations and athletic contexts (8). Understanding these dynamics could lead to targeted interventions designed to improve lower extremity function and overall physical performance. The present study was designed with the objective of evaluating a potential correlation of body composition and hamstring flexibility with closed kinetic chain lower extremity stability in young adults.

2. Materials and Methods

2.1.Participants

This cross-sectional study was conducted at Trakya University Faculty of Medicine between September 2024 and January 2025. The inclusion criteria were that the participants should be 18–25 years of age; be undergraduate students at the Faculty of Medicine or Faculty of Health Sciences of the Trakya University (Türkiye), and have a moderate levels of physical activity according to the Saltin-Grimby physical activity scale (1). Exclusion criteria encompassed individuals who had experienced pain or chronic comorbidities that could impact the study's assessments, or those who had experienced a fracture or dislocation of the lower extremity within the previous 12 months.

Subjects volunteered for the study in accordance with the Declaration of Helsinki and signed the Informed Consent Form. The necessary permission and approval for the study was obtained from the University Clinical Research Ethics Committee (TÜTF-GOBAEK-14/07/02.09.2024).

2.2. Sample Size Calculation

In accordance with the methodology proposed by Lepinet et al. (2), the effect size was calculated to be 0.60. The study was designed to include a total of 90 volunteers, with an 80% power and a 5% error level.

2.3. Measurements

The data collection process encompassed the following components: demographic data, eligibility assessment, signed informed consent forms, body composition analysis, assessment of hamstring flexibility, and assessment of lower extremity closed kinetic chain function. All assessments were conducted on the same day of the week between the hours of 9:00 and 12:00. To ascertain the level of physical activity within the context of the fitness assessment, participants were requested to indicate which description most closely aligns with their level of physical activity during their leisure time over the past year, as defined by the Saltin-Grimby physical activity scale (1). Individuals who indicated

screen (computer, TV) activities, reading books, or other sedentary pursuits were classified as inactive. Those who reported engaging in moderate-intensity physical activities, such as walking or cycling for a minimum of four hours per week, were categorized as moderately active. Individuals who responded that they participated in recreational sports, heavy outdoor activities, or rowing for a minimum of four hours per week were classified as highly active. Finally, those who indicated that they engaged in heavy exercise or participated in sports competitions on most days of the week were considered to be very highly active. Individuals who did not meet the criteria for a moderate physical activity level were excluded from the study.

2.3.1. Body Composition Analysis

A Tanita MC-780 multi frequency segmental Body Composition Analyzer (Tanita Corporation, Tokyo) was employed for the purpose of conducting a body composition analysis of the participants. The height of the participants was measured by using a stadiometer, and their age and height were entered into the equipment manually. The bioimpedance analysis measurements were conducted in accordance with the instructions provided by the manufacturer. The participants were instructed to assume an upright posture with their bare feet touching the sole of the analyzer while wearing light clothing (3) . The data provided included measurements of weight (total body), percent fat mass, fat mass, fat free mass, trunk muscle mass, appendicular skeletal muscle mass. In addition, fat mass index, fat free mass index, and appendicular skeletal muscle mass index values were calculated by dividing fat mass, fat free mass, and appendicular skeletal muscle mass values by the square of the height and fat mass to fat-free mass ratio was obtained by dividing fat mass value by fat free mass value (4-6). BMI was calculated according to the following formula: body mass in kilograms divided by the square of stature in meters (kg/m^2) (7).

2.3.2. Sit-and-Reach Test (SRT)

The assessment of hamstring flexibility was conducted through the administration of the SRT. The SRT was conducted in accordance with the guidelines set forth in the EUROFIT manual, utilizing a standard SRT apparatus. The participants were instructed to assume a seated position without shoes, with the knees fully extended, the feet positioned at shoulder width with the soles of the feet resting on the test bench, the arms extended with the palmar side of the hands facing down, the head between the arms, and to bend forward with the body while maintaining the maximum reach position for one to two seconds (Figure 1). Subsequently, the distance reached by the fingers was determined in centimeters. The test was repeated twice, and the largest value was recorded (8, 9).

Figure 1. Sit-and-reach Test application

2.3.3. The CKCLEST Test

The CKCLEST was conducted in accordance with the methodology delineated by Arikan et al (10). The evaluator introduced the participants to the CKCLEST method, explaining its procedure. The test required the provision of a stable floor, a mat, and a chronometer. The initial position entailed assuming a plank posture on the mat with the forearms on the floor, the feet positioned at shoulder width and in contact with the floor, and the body forming a straight line (Figure 2a, 2b). Subsequently, the subject was required to bring one foot diagonally outside the other foot, making contact with the side of the other foot, and return to the starting position (Figure 2c, 2d). This movement was repeated with both feet for a period of 15 seconds. The number of times the foot touched the side of the other foot and the floor was recorded. Prior to the administration of the actual test, each subject was provided with an opportunity to familiarize themselves with the procedure. The test was repeated three times, with a one-minute interval between repetitions, and the highest score achieved was used as the data.

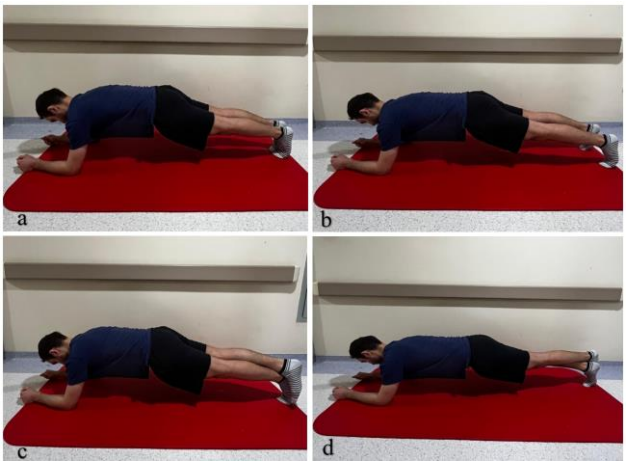

Figure 2. The Closed Kinetic Chain Lower Extremity Stability Test starting position (a,b) and application (c,d)

2.4. Statistical analysis

The analysis was conducted using the IBM SPSS Statistics software, version 23. The Shapiro-Wilk test was employed to ascertain the normal distribution of the data (values of P>0.05 were deemed indicative of normal distribution). Categorical data are presented as a frequency (%), while numerical data are presented as a mean (standard deviation) and a median (minimum-maximum). As the assumption of normal distribution was not confirmed, the Mann-Whitney U test was used for comparisons between groups, and Spearman correlation test was used to assess the relationship between CKCLEST scores and body composition measurements and SRT scores. A p-value less than 0.05 was considered statistically significant.

3. Results

A total of 92 young adults, comprising 46 females and 46 males aged 20-25 years, who were uninjured and had a moderate level of physical activity, were evaluated in the study. Table 1 provides an overview of the average weight, height, BMI, and body composition measurements, as well as SRT scores and CKCLEST scores of the participants. A statistical difference was observed between male and female participants in terms of body composition measurements, excluding fat mass, and SRT scores. However, CKCLEST test scores were found to be similar.

Table 1. Demographic characteristics, body composition measurements, SRT and CKCLEST scores of the participants

	Total (N=92) **Mean (SD)** **Median (min-max)**	**Female (N=46)** **Mean (SD)** **Median (min-max)**	**Male (N=46)** **Mean (SD)** **Median (min-max)**	**p**
Age, years	22.48 (1.15) 22.0 (20.0-25.0)	22.59 (0.96) 22.5 (21.0-25.0)	22.37 (1.32) 22.0 (20.0-25.0)	0.359
Weight*, kg	69.91 (15.85) 69.1 (43.4-113.5)	61.16 (13.37) 58.3 (43.4-113.5)	78.65 (13.14) 77.15 (50.6-110.2)	<0.001
Height*, cm	171.84 (9.21) 171.0 (153.0-195.0)	165.11 (6.11) 165.0 (153.0-180.0)	178.57 (6.44) 178.0-167.0-195.0)	<0.001
BMI*, kg/m^2	23.51 (4.39) 23.4 (16.5-39.3)	22.40 (4.51) 22.0 (17.1-39.3)	24.62 (4.00) 24.5 (16.5-36.9)	0.002
Percent FM*, (%)	21.63 (7.90) 20.65 (4.2-44.9)	25.27 (7.26) 24.35 (12.7-44.9)	17.99 (6.81) 17.15 (4.2-33.9)	<0.001
FM, kg	15.53 (8.13) 14.0 (2.5-51.0)	16.29 (8.55) 14.9 (5.8-51.0)	14.76 (7.69) 13.75 (2.5-35.3)	0.380
FFM*, kg	51.77 (11.16) 51.75 (34.9-83.2)	42.60 (5.21) 42.25 (34.9-59.4)	60.95 (7.25) 60.15 (40.7-83.2)	<0.001
FM/FFM*	0.30 (0.14) 0.27 (0.05-0.86)	0.37 (0.15) 0.34 (0.15-0.86)	0.24 (0.11) 0.22 (0.05-0.54)	<0.001
FMI*, kg/m^2	5.31 (2.83) 4.39 (0.79-17.65)	5.95 (3.01) 5.59 (2.27-17.65)	4.67 (2.52) 4.19 (0.79-12.51)	0.024

FFMI*, kg/m^2	17.36 (2.45) 13.29-23.20	15.62 (1.64) 15.17 (13.47-20.55)	19.09 (1.82) 19.03 (13.29-23.20	<0.001
TMM*, kg	28.04 (4.97) 28.0 (19.2-41.8)	24.30 (3.02) 24.05 (19.2-34.4)	31.78 3.51) 31.20 (23.3-41.8)	<0.001
ASMM*, kg	23.62 (6.14) 23.25 (15.0-37.3)	18.30 (2.28) 18.4 (15.0-25.0)	28.93 (3.64) 28.85 (17.40-37.30)	<0.001
ASMMI*, kg/m^2	7.89 (1.48) 7.82 (5.68-2.15)	6.71 (0.70) 6.50 (5.92-8.75)	9.07 (1.05) 9.10 (5.68-12.15)	<0.001
SRT score*	24.66 (9.98) 24.0 (3.0-48.0)	26.92 (8.41) 26.25 (12.0-48.0)	22.40 (10.97) 22.0 (3.0-48.0)	0.032
CKCLEST score	14.66 (3.39) 14.0 (9.0-28.0)	14.22 (3.00) 13.5 (9.0-25.0)	15.11 (3.71) 15.0 (9.0-28.0)	0.162

ASMM: Appendicular skeletal muscle mass, ASMMI: Appendicular skeletal muscle mass index, CKCLEST:The Closed Kinetic Chain Lower Extremity Stability Test, FFM:fat free mass, FFMI: fat free mass index, FM:fat mass, FMI: fat mass index, SRT: Sit-and-reach test, TMM: trunk muscle mass

**Significant difference between males and females (p<.001)*

Mann-Whitney U test

Level of significance set at p < 0.05

Analysis of the data showed no significant correlation between CKCLEST test scores and weight, height, BMI, percentage of total body fat, total fat mass, fat-free mass, fat-free mass index, fat mass to fat-free mass ratio, fat mass index, fat-free mass index, trunk muscle mass, skeletal muscle mass and skeletal muscle mass index. Furthermore, a lack of correlation was identified between CKCLEST test scores and SRT scores. The results of the correlation analysis are shown in Table 2.

Table 2. The correlations between CKCLEST scores and body composition measurements and SRT scores

		Weight	**Height**	**BMI**	**Percent FM**	**FM**	**FFM**	**FM/FFM**	**FMI**	**FFMI**	**TMM**	**ASMM**	**ASMMI**	**SRT score**
CKCLEST score	Rho p	0.047 0.658	0.149 0.156	-0.013 0.904	-0.119 0.258	-0.060 0.571	0.099 0.349	-0.125 0.237	- 0.095 0.368	0.054 0.609	0.101 0.339	0.102 0.335	0.070 0.510	0.175 0.095

ASMM: Appendicular skeletal muscle mass, ASMMI: Appendicular skeletal muscle mass index, CKCLEST:The Closed Kinetic Chain Lower Extremity Stability Test, FFM:fat free mass, FFMI: fat free mass index, FM:fat mass, FMI: fat mass index, SRT: Sit-and-reach test, TMM: trunk muscle mass

Spearman correlation test

Level of significance set at p < 0.05

4. Discussion

The findings of the present study demonstrate that closed kinetic chain lower extremity stability test scores are comparable between genders, and that health-related physical fitness parameters, including body composition and hamstring flexibility, do not exert a significant influence on stability during lower extremity closed kinetic chain activities in individuals with moderate physical activity.

Body composition, muscle strength and endurance, and flexibility are physiological parameters that are associated with health-related physical fitness (11). Each of these parameters has the potential to influence the risk of injury and to affect performance in both daily life and sports activities (12-16). The study conducted by Arikan et al. (10) revealed a moderate correlation between lower extremity closed kinetic chain stability and lower extremity muscle strength and endurance, which are health-related fitness parameters. In the study conducted by Almansoof et al. (17), a positive and moderate correlation was observed between soleus extensibility and lower extremity closed kinetic stability. To the best of my knowledge, the association of CKLEST with body composition and hamstring flexibility has never been evaluated before.

Factors affecting lower extremity stability tests are important considerations in developing rehabilitation protocols. While existing research suggests that women and men exhibit different kinematic patterns during rehabilitation exercises, the current study found no significant difference in closed kinetic chain lower extremity stability between genders. Previous findings emphasise that women generally exhibit smaller peak knee flexion angles and larger peak hip extension angles during rehabilitation

exercises compared to men during closed kinetic chain rehabilitation exercises (18). In addition, women were observed to have greater anterior pelvic tilt, hip anteversion, quadriceps angles, tibiofemoral angles and genu recurvatum than men (19). These kinematic differences extend to upper limb stability tests where different ground reaction force patterns have been observed between males and females (20). Nevertheless, despite the aforementioned differences, the results of the current study are consistent with the notion that anthropometric factors, including upper and lower limb length and foot size, exert minimal influence on postural balance control in both sexes (21). The findings of the study call into question the assumption of inherent sex differences in closed kinetic chain lower extremity stability, suggesting that stability assessments may need to be more closely tailored to individual abilities rather than broad sex-based distinctions. In conclusion, while there are documented kinematic and anatomical differences between men and women, the study highlights the importance of focusing on personalised rehabilitation approaches. Such approaches should prioritise individual variability in stability rather than relying solely on gender-specific guidelines. Future studies should continue to investigate the underlying mechanisms contributing to these findings and further validate the applicability of the results in different populations.

Research has found that the strength of the lower extremity extensors in closed kinetic chain exercises is more closely related to jump performance compared to open kinetic chain exercises (22). Fat free mass is a significant factor linking body mass and jumping height, highlighting lower-extremity strength and neuromuscular performance in determining jump height (23). Conversely, fat mass has a negative impact on muscle strength and jump test performance in both young and older adults. (24). Studies have shown that regional and whole-body fat free mass correlate with strength in various exercises, with the relationship improving as muscle mass and thigh area increase (25). Higher appendicular skeletal muscle mass is associated with improved dynamic balance and stronger lower extremity strength in healthy college men (5). In women, lower extremity lean mass, particularly in those with lower lean mass, has been demonstrated to influence knee loading during landing and may impact biomechanical changes during prolonged exercise (26). While these studies suggest that lean mass plays a significant role in lower extremity performance and stability, the relationship between body composition and closed kinetic chain stability is complex and involves multiple factors beyond just muscle mass. Ferreira et al. (21) reported that body composition variables generally do not affect stability tests in individuals with a normal BMI, thereby supporting the results of the current study, which found no correlation between body composition and closed kinetic chain lower extremity stability. These findings emphasise the necessity for a more comprehensive approach to assessing lower extremity stability, incorporating factors beyond mere body composition, to ensure the efficacy of rehabilitation protocols.

Fascia is a network of connective tissue that supports the body and affects its biomechanics. Myofibroblasts regulate tissue tension and can influence muscle function. Myofascial chains show that muscles work together in interconnected ways, maintaining skeletal stability. Different myofascial chains of muscle groups, including the superficial back line and the thoracolumbar fascia, play a critical role in facilitating force transmission, coordinated movements, stability, and load transmission between the limbs and the core (27). The bi-articular hamstrings and gastrocnemius, elements of the superficial back line, work in a closed kinetic chain network to coordinate greater ranges of motion in the hip, knee, and ankle and contribute to a higher level of regulation (28). Analyses at the level of individual muscle groups revealed that the biarticular hamstrings and gastrocnemius serve to enhance the flexibility afforded by the motor control strategy (29). The study found no correlation between lower extremity closed kinetic chain stability and hamstring flexibility assessed by the sit and reach test. This contrasts with the findings of Almansoof et al. (17), who observed a significant positive correlation between weight-bearing ankle dorsiflexion and closed kinetic chain stability in male recreational athletes. Similarly, Encarnación-Martínez et al. (30) discovered that reduced hamstring flexibility, measured through the passive straight leg raise test, was associated with lower anterior reach on the modified star excursion balance test in physically active sport science students. These differences could stem from various factors, such as the method used to assess hamstring flexibility, the type of participants involved, and the specific measures of stability. The SRT is a test that has important benefits such as being easy to apply, requiring minimum skill, and evaluating large-scale flexibility in the evaluation of hamstring flexibility. However, the relationship of this test with lower extremity stability is not as direct as with ankle dorsiflexion. Therefore, the fact that the SRT does not correlate with CKCLEST is an indication of the complexity of lower extremity function and the interaction of many

factors. Mitchell et al. (31) found that when hip and knee flexion and ankle dorsiflexion were combined, ankle dorsiflexion range of motion decreased, suggesting different positions in the test can affect results. While the studies by Almansoof et al. (17) and Encarnación-Martínez et al. (30) provide evidence that flexibility is positively associated with dynamic stability under certain conditions, the findings of the current study suggest that this relationship may not be universally valid and may depend on the context and specific tests used, highlighting the need for further research to better understand the complex interactions between different flexibility measures and closed kinetic chain lower extremity stability. Differences in testing methods and participant characteristics may significantly influence the results, and a more comprehensive approach to flexibility and stability assessment is needed to fully explain these relationships.

The present study involved young, uninjured individuals with moderate physical activity levels, which limits the generalisability of the findings to different populations with injuries, different health conditions, age groups, and physical activity levels. Future research should explore the performance of the CKCLEST test in diverse clinical groups. The cross-sectional design of the study precludes the drawing of definitive conclusions about cause-and-effect relationships, underscoring the necessity for longitudinal studies to evaluate changes in CKCLEST scores over time and their correlation with rehabilitation outcomes. Additionally, future studies could incorporate biomechanical analyses to enhance understanding of the muscles and joints involved in the test. The study's limitations also stem from the lack of control over participants' psychological state and motivation, introducing uncertainty into the interpretation of results. It is recommended that future studies take these factors into consideration when analysing CKCLEST performance, with the aim of achieving a more comprehensive understanding of test results and individual differences. Furthermore, these future studies will enhance the application of CKCLEST in clinical and sporting fields, as well as provide valuable insights into assessing and improving lower extremity stability.

5. Conclusion

The absence of a significant correlation between CKCLEST and body composition, as well as the SRT, in this study carries important implications for the clinical applications of the test. The finding that the CKCLEST is independent of gender, body composition and indirectly of the nutritional status of individuals suggests that this test is a reliable tool for assessing lower extremity stability. The results of study offer a significant advantage in the comparison and evaluation of individuals with different body structures. The present study lends support to the notion that, in clinical practice, greater emphasis should be placed on neuromuscular control, coordination, strength, and endurance as opposed to body composition or hamstring flexibility when assessing lower extremity stability. Consequently, rehabilitation programmes must be adapted to incorporate these principles.

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Bibliometric Analysis of Studies on the Relationship between COVID-19 Vaccines and Myocarditis

COVID-19 Aşıları ile Miyokardit Arasındaki İlişkiye Dair Çalışmaların Bibliyometrik Analizi

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Abstract: In this study, a bibliometric analysis of the worldwide trends of studies on the relationship between COVID-19 vaccines and myocarditis was performed. This bibliometric study investigates the studies on the relationship between COVID-19 vaccines and myocarditis conducted worldwide between the years 2020-2023. For this purpose, 746 studies were examined as a result of searches made in Web of Science and Scopus databases. For data collection, information such as title, author names, publication year, journal name and number of citations were used. All text data are analyzed with "VOSviewer software" to ensure accuracy and reliability. In this study, analyses using text mining and data visualization methods (eg bubble maps) helped to make the results more understandable. In this article, information is given about 733 articles from Web of Science and Scopus databases and 11797 citations to these articles. The average number of citations per article is 16 and the H index is 45. As of 2021, both the number of articles and the number of citations have increased. Almost all of the articles have been published in the cardiovascular system and other health sciences. The USA, Italy, England and Japan are the countries that published the most articles (54%) on this subject. Most of the articles (79%) are in the SCI-Expanded category. The findings we obtained in our study show that many researchers are active in studies on the relationship between COVID-19 vaccines and myocarditis and that the research in this field is increasing.
Keywords: Analysis, Bibliometric, COVID-19, myocarditis, vaccine.

Özet: Bu çalışmada, COVID-19 aşıları ile miyokardit arasındaki ilişkiye dair dünya çapındaki çalışmaların eğilimlerinin bibliyometrik analizi yapılmıştır. Bu bibliyometrik çalışma, 2020-2023 yılları arasında dünya çapında COVID-19 aşıları ile miyokardit arasındaki ilişkiye dair yapılan çalışmaları incelemektedir. Bu amaçla, Web of Science ve Scopus veri tabanlarında yapılan taramalar sonucunda 746 çalışma incelenmiştir. Veri toplamada, başlık, yazar adları, yayın yılı, dergi adı ve atıf sayısı gibi bilgiler kullanılmıştır. Tüm metin verileri, doğruluk ve güvenilirliği sağlamak için "VOSviewer yazılımı" ile analiz edilmiştir. Bu çalışmada, metin madenciliği ve veri görselleştirme yöntemleri (örneğin kabarcık haritaları) kullanılarak yapılan analizler, sonuçların daha anlaşılır olmasına yardımcı olmuştur. Bu makalede, Web of Science ve Scopus veri tabanlarından alınan 733 makale ve bu makalelere yapılan 11797 atıf hakkında bilgi verilmektedir. Makale başına düşen atıf sayısı ortalaması 16 olup H indeksi 45'tir. 2021 yılı itibariyle hem makale sayısı hem de atıf sayısı artmıştır. Makalelerin neredeyse tamamı kardiyovasküler sistem ve diğer sağlık bilimleri alanında yayınlanmıştır. Bu konuda en fazla makale yayınlayan ülkeler ABD, İtalya, İngiltere ve Japonya'dır (%54). Makalelerin çoğu (%79) SCI-Expanded kategorisindedir. Çalışmamızda elde ettiğimiz bulgular, birçok araştırmacının COVID-19 aşıları ile miyokardit arasındaki ilişki üzerine çalışmalarda aktif olduğunu ve bu alandaki araştırmaların arttığını göstermektedir.
Anahtar Kelimeler: Analiz, Bibliyometrik, COVID-19, miyokardit, aşı.

Ethics Committee Approval: This study is a bibliometric analysis that does not include human or animal experiments. Therefore, ethics committee approval is not required.

Informed Consent: The author declared that informed consent was obtained from the participants in the study.

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Copyright Transfer Form: Copyright Transfer Formwas signed by all authors.

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1. Introduction

This research examines the worldwide trends in studies on the relationship between Covid-19 vaccines and myocarditis. The bibliometric study carried out in this area reveals the reflection of studies on the relationship between COVID-19 vaccines and myocarditis to scientific research.

Myocarditis is an important cardiovascular disease resulting from inflammation of the heart muscle. This condition has been associated with a number of factors that have adverse effects on the cardiovascular system. In recent years, the COVID-19 pandemic has led to a major health crisis worldwide. There is growing evidence that myocarditis cases are increasing among the clinical manifestations caused by COVID-19. However, the relationship of COVID-19 vaccines to the development of myocarditis is not yet fully understood (1-3).

COVID-19 vaccines have been rapidly developed and implemented to reduce the effects of the pandemic and control the spread of the disease. Widespread use of these vaccines has been a major step forward in limiting the spread of the disease and preventing serious health problems. However, the issue of whether there is a relationship between COVID-19 vaccines and myocarditis has been an important research area for both health authorities and scientists (4-6).

Possible causes of myocarditis include viral infections and autoimmune reactions caused by immune responses. COVID-19 is a disease caused by the SARS-CoV-2 virus, which causes respiratory infections. In this context, the use of COVID-19 vaccines to stimulate the immune system requires us to understand the effects of immune responses and possible inflammatory effects on the development of myocarditis (7-9).

The potential relationship between COVID-19 vaccines and myocarditis has attracted attention, especially with the increasing incidence of myocarditis occurring in young adults. In the literature, it is stated that myocarditis cases have been observed especially after mRNA-based COVID-19 vaccines. However, the number of these cases is still quite low in the general population, and considering the benefits of vaccines, it should be stated that these cases are rare (10, 11).

This article aims to examine in more detail the possible relationship between COVID-19 vaccines and myocarditis. It will thoroughly evaluate the available evidence in the literature and help us better understand the effects of COVID-19 vaccines on the development of myocarditis. In addition, while emphasizing the positive effects of vaccines on general health, this article aims to provide important perspectives on how to address possible side effects such as myocarditis (12, 13).

This study, it is aimed to bibliometrically analyze the worldwide trends regarding the studies on the relationship between COVID-19 vaccines and myocarditis. This review aims to reveal the global publications on the relationship between COVID-19 vaccines and myocarditis, made by researchers in different disciplines, using the bibliometric analysis method. The main objective is to explore the importance of publications on this topic and to review relevant trends and clusters.

2. Materials and Metod

A systematic data collection method, search strategy and network analysis software were used to ensure the reliability of our study and the accuracy of the results. The use of these methods enabled the collection and analysis of the most up-to-date and comprehensive data in the literature. In addition, the analysis of this data provides information on current trends and trends in the scientific community regarding the relationship between COVID-19 vaccines and myocarditis. Global publication trends on studies on the relationship between COVID-19 vaccines and myocarditis were determined by examining different factors such as the most influential researchers, countries and the most frequently used keywords.

2.1. Data collection method and search strategy

In this bibliometric study, using the databases "Web of Science Core Collection (WOS, Clarivate Analytics, Philadelphia, PA, USA)" and "Scopus (Elsevier B.V.)" between 2020-2023 (last access date: 07.08.2023) His studies on the analysis of global trends in the relationship between 19 vaccines and myocarditis were reviewed. As a result of searches made using the keywords "vaccine, myocarditis, COVID-19" in the database, 746 studies were found. The remaining 733 articles were used when ineligible studies from these studies, those in 2020 and before, and studies other than the article were eliminated. The articles in the database were analyzed using information such as article title,

authors' names, publication year, journal name and number of citations. The materials were accessed using the online library and digital resources of Van Yüzüncü Yıl University. The search language is English.

In the study, publications related to the global trends in the relationship between COVID-19 vaccines and myocarditis using WOS and Scopus databases were examined using bibliometric methods. WOS and Scopus are comprehensive databases of academic articles published in many disciplines and topics. These databases are important resources for conducting interdisciplinary research. In this study, publications in WOS and Scopus databases were collected using specific search terms and subjected to bibliometric analysis. Data were collected using the online interfaces of WOS and Scopus and analyzed using various parameters. Data on post-growth, most active countries and institutions, and keyword matching were analyzed. All articles have been meticulously reviewed.

2.2. Network analysis

In this bibliometric study, "Network of collaboration, highlights and future trends" using VOSviewer (version 1.6.19, University of Leiden, The Netherlands) to identify global trends in the relationship between COVID-19 vaccines and myocarditis, and key topics of research in this area. analyzed. Web of Science and Scopus databases were used for systematic data collection, and all text data of the publications included in the study were collected and evaluated with VOSviewer software. These analyzes were performed using text mining and data visualization (bubble maps and other graphical) methods to ensure the accuracy and reliability of the study.

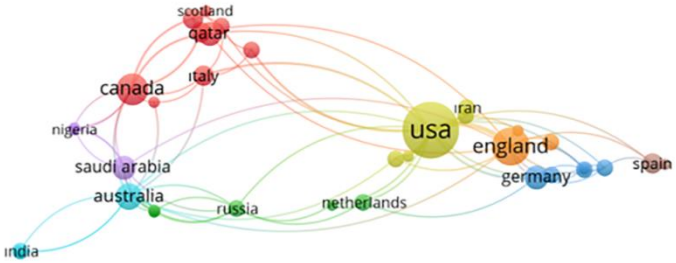

Figure 1. International collaboration network map. (Collaboration between countries is shown by lines, with thickness indicating strength, and circle/text size indicating the level of international collaboration)

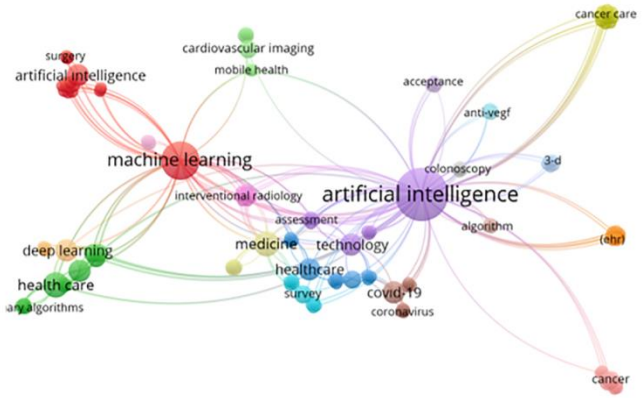

Figure 2. Keyword analysis. (Shows which keywords the topic is associated with and how often those keywords are used)

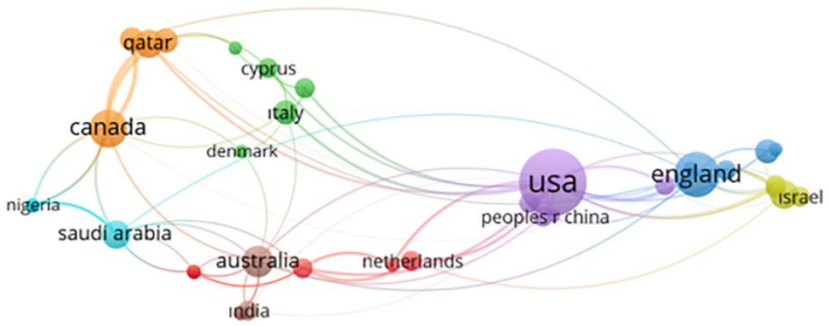

Figure 3. Bibliographic coupling analysis for country. (The relatedness of items was determined based on the number of references the share)

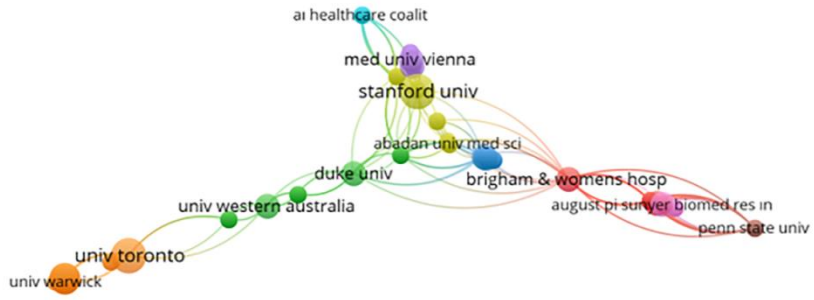

Figure 4. Bibliographic coupling analysis for organization. (The relatedness of items was determined based on the number of references the share)

2.3. Bubble Maps

In the bibliometric analyzes made with VOSviewer, the graphs called "Bubble maps" show the grouping of the articles published in a research area according to the frequency of the keywords. Each keyword or group is represented as a "balloon" and the size of the balloon depends on the frequency of that keyword or group. The balloons are colour-coded, ensuring that keywords related to the same group or topic are close together.

The thickness and length of the lines between the balloons show how often these keywords are used together, and with which other keywords they are used. Thus, by using "Bubble maps" in a bibliometric analysis, it is possible to identify the most important keywords or groups in the research area and visualize the relationships between these keywords.

Bubble maps, which are frequently used in bibliometric analysis, consist of small circles (bubbles), each representing a publication. The size of the bubbles is proportional to the number of citations the publication receives. Colours indicate sets or topics of publications. The thickness of the lines between two broadcasts reflects the co-citation

frequency between those broadcasts. Bubble maps allow researchers to quickly and easily understand keywords, citations, authors, institutions, countries and topics among publications on a particular topic.

3. Results

733 published articles were retrieved from the WOS and Scopus databases. A total of 11,797 citations were made to articles (7056 citations without self-citations). The average number of citations per article is 16. The H index is 45. Especially since 2021, both the number of citations and the number of articles showed an increasing trend. The distribution of publications and citations is shown in Figure 5. As shown in Figure 5, there was a steady increase in both the number of publications and citations over the years, with a sharp peak in 2022. The publication count rose significantly from 2021 onwards, corresponding with widespread vaccination campaigns and increased awareness of possible adverse effects, including myocarditis. While the number of publications slightly decreased in 2023, the cumulative citations remained high, indicating the sustained impact of earlier studies in the field.

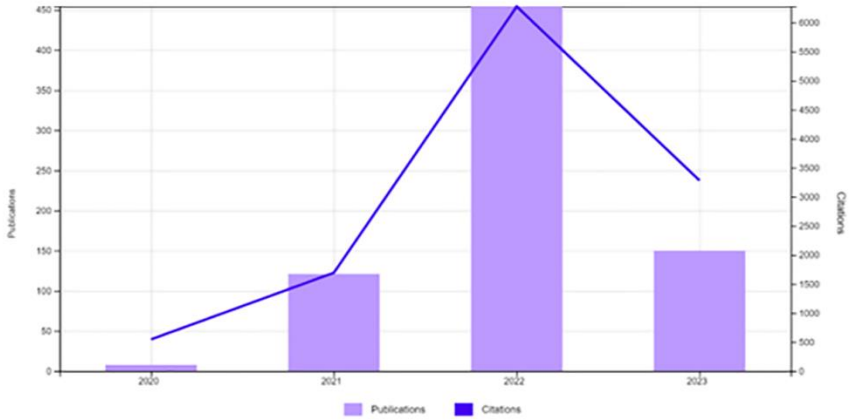

Figure 5. Frequency of publications and citations by year (last accessed 07.08.2023)

Most articles were published in the fields of Cardiac Cardiovascular Systems (28.38%), General Internal Medicine (24%), Immunology (14.3%), Experimental Medical Research (11.9%) followed by Pediatrics (8.2%), Infectious Diseases (5.7%), and Pharmacology (5%). As shown in Figure 2, keyword co-occurrence analysis revealed major thematic clusters in the literature. “Artificial intelligence,” “machine learning,” “healthcare,” and “deep learning” were among the most frequently used terms. This pattern strongly suggests that computational tools and technology-driven approaches are increasingly being used in the study of myocarditis in the context of COVID-19 vaccination, suggesting a shift toward data-driven clinical research. The distribution of publications by research area is shown in Table 1.

The USA ranks first in the number of articles published (n=262; 35.7%), followed by Italy (n=70; 9.6%); England (n=64; 8.7%) and Japan (n=57; 7.8%) followed. Publications originated from a total of 77 countries around the world, including these first 4 countries, and Turkey ranked 17th. As illustrated in Figure 1, the United States is shown as the central hub with strong collaborative links to countries such as the United Kingdom, Canada, Germany, and Italy. These connections highlight the high level of international cooperation in this area, highlighting the importance of cross-border data sharing and collective scientific effort during the pandemic. The first 23 countries with 10 or more publications are listed in Table 2. The bibliographic coupling analysis presented in Figure 3 highlights the interconnectivity of countries based on shared references in their publications. The United States, England, Canada, and Germany exhibited the highest degree of bibliographic coupling, suggesting that researchers from these countries often rely on similar sources and foundational literature. Such a shared reference base reflects coordinated and thematically aligned research across leading nations.

In this respect; the University of London (3.4%), University of California System (3.1%), and Harvard University (2.7%) were the leading institutions. Accordingly, most of the strongest institutional collaborations were based in the United States. A sample of 20 out of 1,585 institutional records is shown in the table (Table 3). Figure 4 presents the bibliographic coupling analysis of institutional collaborations. Stanford University, Harvard University, Brigham and Women's Hospital, and Duke University were among the most interconnected institutions. These institutions emerged as central nodes within the network, suggesting their key role in advancing research and fostering collaboration in studies related to COVID-19 vaccine-induced myocarditis.

Table 1. Publication Categories.

Research Areas	Record Count	% of 733
Cardiac Cardiovascular Systems	208	28.377
Medicine General Internal	176	24.011
Immunology	105	14.325
Medicine Research Experimental	87	11.869
Pediatrics	60	8.186
Infectious Diseases	42	5.730
Pharmacology Pharmacy	37	5.048
Public Environmental Occupational Health	31	4.229
Peripheral Vascular Disease	23	3.138
Microbiology	22	3.001
Radiology Nuclear Medicine Medical Imaging	22	3.001
Biochemistry Molecular Biology	14	1.910
Virology	14	1.910
Health Care Sciences Services	11	1.501
Emergency Medicine	10	1.364
Multidisciplinary Sciences	10	1.364

Showing 16 out of 63 entries

Table 2. Countries with at least 10 publications.

Countries/Regions	Record Count	% of 733
USA	262	35.744
ITALY	70	9.550
ENGLAND	64	8.731
JAPAN	57	7.776
CHINA	46	6.276
CANADA	40	5.457
GERMANY	38	5.184
ISRAEL	28	3.820
SOUTH KOREA	28	3.820
INDIA	27	3.683
AUSTRALIA	25	3.411
SPAIN	20	2.729
FRANCE	19	2.592
GREECE	16	2.183
IRAN	16	2.183
SAUDI ARABIA	13	1.774
TURKEY	**13**	**1.774**
PAKISTAN	12	1.637
BRAZIL	11	1.501
NETHERLANDS	11	1.501
QATAR	11	1.501
SINGAPORE	11	1.501
TAIWAN	11	1.501

Showing 23 out of 77 entries

Table 3. List of the top affiliations.

Affiliations	Record Count	% of 733
UNIVERSITY OF LONDON	25	3.411
UNIVERSITY OF CALIFORNIA SYSTEM	23	3.138
HARVARD UNIVERSITY	20	2.729
CENTERS FOR DISEASE CONTROL PREV USA	17	2.319

TEL AVIV UNIVERSITY	17	2.319
MAYO CLINIC	16	2.183
HARVARD MEDICAL SCHOOL	15	2.046
UDICE FRENCH RESEARCH UNIVERSITIES	15	2.046
KAISER PERMANENTE	14	1.910
UNIVERSITY OF TEXAS SYSTEM	14	1.910
EMORY UNIVERSITY	12	1.637
UNIVERSITY COLLEGE LONDON	12	1.637
UNIVERSITY OF HONG KONG	12	1.637
UNIVERSITY OF TORONTO	12	1.637
US DEPARTMENT OF VETERANS AFFAIRS	12	1.637
SACKLER FACULTY OF MEDICINE	11	1.501
UNIVERSITY OF OXFORD	11	1.501
VETERANS HEALTH ADMINISTRATION VHA	11	1.501
YALE UNIVERSITY	11	1.501

Showing 20 out of 1585 entries (least 11 publications)

Table 4. Web of Science Index.

Web of Science Index	Record Count	% of 733
Science Citation Index Expanded (SCI-EXPANDED)	578	78.854
Emerging Sources Citation Index (ESCI)	155	21.146
Conference Proceedings Citation Index – SCI (CPCI-S)	17	2.319
Social Sciences Citation Index (SSCI)	15	2.046

4. Conclusion

This research shows that scientific publications on the relationship between COVID-19 vaccines and myocarditis have increased globally. This study aimed to determine the global trends and clusters related to the relationship between COVID-19 vaccines and myocarditis, and to reveal which areas the research in this field focuses on and in which countries it is done the most. In addition, important journals, authors and studies in this field were identified, and it was pointed out in which areas the relationship between COVID-19 vaccines and myocarditis will be studied in the future and which researchers could be pioneers in this field.

This study presents a bibliometric analysis examining worldwide trends and publication trends in the relationship between COVID-19 vaccines and myocarditis. The article is based on the analysis of 733 articles obtained as a result of a large literature review. In this analysis, the most influential countries, institutions, authors, journals and keywords on the relationship between COVID-19 vaccines and myocarditis were determined. Its results can be used to guide research in this area and provide a roadmap for research on the relationship between COVID-19 vaccines and myocarditis.

The results of this study aim to reveal the importance and prevalence of research in this field by presenting a global perspective on the relationship between COVID-19 vaccines and myocarditis. This study can be a useful resource for health researchers, policymakers and industry representatives.

In conclusion, this bibliometric analysis reveals global trends and important studies in the field of COVID-19 vaccines and myocarditis relationship and provides important insights into the future directions of research in this area.

Limitations

Bibliometric analysis is a method used only to identify trends and trends in the literature and does not make an assessment of the accuracy or quality of the actual data. Therefore, more comprehensive studies on the research topic should be conducted and a similar analysis should be performed using different databases. Moreover, bibliometric analysis is not intended to assess the applicability, as this method only aims to analyze data from the available literature and provide an overview of specific issues.

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Highlights

1) This study analyzes the global trends and implications of research on the relationship between COVID-19 vaccines and myocarditis.
2) The relationship between COVID-19 vaccines and myocarditis, research is becoming widespread and it is expected to become more widespread in the future.
3) The relationship between COVID-19 vaccines and myocarditis is used as a useful tool for its results in the medical field.
4) The number of studies on the relationship between COVID-19 vaccines and myocarditis is increasing every year around the world.
5) Among the countries examined in the study, the USA, Italy, England and Japan are the prominent countries. Türkiye is in 17th place.

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Acil Servise Başvuran Travmatik Olmayan Göğüs Ağrısı Hastalarının Değerlendirilmesi: İleri Dönük Gözlemsel Çalışma

Evaluation of Patients with Non-Traumatic Chest Pain Presenting to the Emergency Department: A Prospective Observational Study

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Abstract: Chest pain (CP) is one of the most common reasons for emergency department visits, and these patients can experience high mortality and morbidity. Out of 87320 visits to our emergency department, 2878 (3.3%) were due to non-traumatic chest pain, and 2,811 patients (97.7%) were included in the study. The percentage of patients with normal EKG findings is 63%, while the rate of patients diagnosed with ST-segment elevation myocardial infarction is 6.3%. The risk of Acute Coronary Syndrome (ACS) is approximately 1.5 times higher in men. The rate of serious cardiac events within one month after discharge is 2.8%. During this period, serious cardiac events and/or death were observed in 18.4% of patients at high risk according to the TIMI score and in 7.7% of those at high risk according to the GRACE score. The most common diagnosis for patients presenting with chest pain is ACS, with unstable angina (UAP) being the most frequently identified subtype. In women, ACS diagnosis was found to be more commonly associated with atypical chest pain. In conclusion, the patients in our study received diagnoses that could lead to high mortality and morbidity, including cardiac causes, pulmonary embolism, pneumothorax, aortic dissection, and even digoxin toxicity. Among patients presenting with atypical pain, 28.5% were diagnosed with ACS, and 33.4% of those whose pain had resolved at the time of admission were also diagnosed with ACS. Therefore, prompt and accurate differential diagnosis of chest pain is of vital importance.
Keywords: Chest pain, emergency department, acute coronary syndrome

Özet: Göğüs ağrısı (GA), acil servislere en sık başvuru nedenlerinden biri olup bu hastalar yüksek mortalite ve morbidite ile seyredebilir. Acil servisimize 87320 başvurunun 2878'i (%3,3) travma dışı göğüs ağrısı nedeniyledir ve 2,811 hasta (%97,7) çalışmaya dahil edilmiştir. EKG bulguları normal olan hasta oranı %63, ST segment elevasyonlu miyokard infarktüsü tanısı alan hasta oranı %6,3'tür. Akut koroner sendrom (AKS) görülme riski erkeklerde yaklaşık olarak 1,5 kat fazla saptanmıştır. Taburculuktan sonra 1 ay içinde ciddi kardiyak olay görülme oranı %2,8'dir. Bu sürede TIMI skorlamasında yüksek riskli olanlarda %18,4'ünde ve GRACE skorlamasında yüksek riskli olanlarda ise %7,7'sinde ciddi kardiyak olay ve/veya ölüm görüldü. GA ile başvuru yapan hastaların en sık aldığı tanı AKS olup; bu kapsamda en sık unstable angina pektoris (UAP) saptandı. Kadınlarda AKS tanısının atipik göğüs ağrısıyla daha sık ilişkilendirildiği bulunmuştur. Sonuç olarak çalışmamızdaki hastalar başta kardiyak nedenler olmak üzere pulmoner emboli, pnömotoraks, aort diseksiyonu hatta digoksin intoksikasyonuna uzanan geniş yelpazede yüksek mortalite ve morbiditeye neden olabilecek tanılar almışlardır. Atipik ağrı nedeniyle başvuran hastaların %28,5'u, başvuru sırasında ağrısı devam etmeyen hastaların %33,4'ü AKS tanısı almıştır. Bu nedenle göğüs ağrısı ayırıcı tanısının hızlı ve doğru yapılması hayati öneme sahiptir.
Anahtar Kelimeler: Göğüs ağrısı, acil servis, akut koroner sendrom

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1. Giriş

Travmatik olmayan göğüs ağrısının (GA) ayırıcı tanısı doğru ve hızlı bir şekilde yapılmadığında mortalite ve morbiditesinin yüksek seyredebilmektedir [1]. Dolayısıyla acil servise (AS) göğüs ağrısı şikayetiyle başvuran hastaya yaklaşım dikkat gerektiren bir süreç olup kritik öneme sahiptir [2]. Akut koroner sendrom (AKS), aort diseksiyonu kardiyak nedenlere; plevral iritasyonlar, gastroözofageal reflü, pulmoner emboli, hiperventilasyon, kas iskelet sistemi ağrıları kalp dışı nedenlere örnek verilebilir. Diğer yandan kardiyak nedenlere bağlı olmayan göğüs ağrısı AKS kliniğini taklit edebilmekte, dolayısıyla klinisyenin ayırıcı tanıyı koyma sürecini uzatmakta ve zorlaştırmaktadır [3]. AS'e GA ile başvuran hastaların tanısı sıklıkla hastanın anamnezi, fizik mauyene, EKG, kardiyak biyobelirteçler ve diğer laboratuar ve görüntüleme testleri ile konulmaktadır [4]. Yanlış tanıların sıklığının, mortalite oranlarının ve ekonomik yükünün fazla olması, başvuru anında tanı konulamayan ancak kısa sürede AKS gelişen hastaların varlığı gibi nedenlerden dolayı klinik değerlendirmede bazı skorlama sistemlerinin kullanılması önerilmiştir. The Thrombolysis In Myocardial Infarction (TIMI) ve Global Registry of Acute Coronary Events (GRACE) skorlamaları AKS tanı şüphesinde kullanılan testlerden bazılarıdır. TIMI ve GRACE gibi hastaların risklerinin belirlenmesine yönelik skorlamalar oluşturulmuştur [5].

Acil Tıp doktorunun acil serviste yıl boyunca travma dışı göğüs ağrısı yönetimini yaptığı hastaların sıklığı ve tanısal oranlarını bilmesi günlük uygulamalarda karşılaşacağı sorunları yönetmesinde etkili olabilir. Bu noktadan hareketle, çalışmamızda acil servisimize travma dışı göğüs ağrısı ile başvuran hastaların sosyodemografik, öz-soygeçmiş özeliklerinin belirlenmesi, klinik bulgularının incelenmesi, göğüs ağrısının özelliklerinin belirlenmesi (ağrının tam lokalizasyonu, tipi, süresi vs.), hasta tanılarının ve yapılan işlemlerin değerlendirilmesi, TIMI ve GRACE risk skorlamalarına göre risklerinin hesaplanması amaçladık.

2. Gereç ve Yöntem

Bu çalışma 01.03.2017-28.02.2018 tarihleri arasında Eskişehir Osmangazi Üniversitesi Sağlık Uygulama ve Araştırma Hastanesi Erişkin Acil Servisi'nde yürütülen ileriye dönük, gözlemsel bir çalışmadır.

Çalışmada veri toplanmaya başlanmadan önce Eskişehir Osmangazi Üniversitesi Klinik Araştırmalar Etik Kurulu'ndan onay alındı. (onay tarihi: 16.02.2017; karar sayısı: 21) Ayrıca tüm hastalardan yazılı onam alındı.

Çalışmamıza 18 yaş ve üzerinde travma dışındaki bir nedene bağlı göğüs ağrısı nedeniyle başvuran ve yazılı onam vererek çalışmaya katılmayı kabul eden hastalar dahil edildi. 18 yaşından küçük hastalar, gebeler, travma nedeniyle başvuran hastalar ve çalışmaya katılmayı kabul etmeyen hastalar dahil edilmedi.

Çalışmamızda veri toplamak amacıyla literatürden faydalanılarak 3 bölümden oluşan bir anket formu oluşturuldu [5-8]. Birinci bölümde hastaların bazı sosyodemografik özelliklerini (yaş, cinsiyet,), öz-soy geçmiş özellikleri, göğüs ağrısının özellikleri (ağrının tipi, ne kadar zamandır olduğu, daha önce ağrısının olup olmadığı vs.) ile ilgili bilgilere yönelik sorular oluşturuldu İkinci bölümünde hastaların klinik değerlendirmesi, vital bulguları, laboratuvar sonuçları ve TIMI-GRACE skorlamaları ile ilgili bilgileri yer almaktadır. Üçüncü bölümde ise hastaların AS'ten taburcu olduktan 1 ay sonrasında GA'nın tekrarlayıp tekrarlamadığı ve bu nedenle herhangi bir sağlık kuruluşuna başvurup başvurmadığını değerlendiren sorular soruldu.

Çalışma tarihleri boyunca AS'e toplam 80829 hasta başvurdu. Bunların 2878'i (%3.5) travma dışı göğüs ağrısı nedeniyleydi. 18 yaş altında kalan, gebe olan ve çalışmaya katılmayı kabul etmeyen 67 hasta dışlanarak kalan 2811' hasta (%97.7) çalışmaya dahil edilmiştir.

Çalışmamızda hastaların koroner arter hastalığı (KAH) ile ilgili risk faktörlerinden Diyabetes Mellitur (DM), hipertansiyon (HT), dislipidemi, (hekim tarafından tanısı konulmuş bir hastalıklarının olup olmadığı), turunkal obezite (erkeklerde bel çevresinin 102, kadınlarda 88 cm ve üstünde olması), sigara kullanımı (en az 6 aydır, her gün en az bir adet sigara içilmesi), yaş (40 yaşından büyük olmak ve kadınlar için 40 yaşından önce menopoza girmiş olmak) ve aile öyküsünde KAH'nın varlığı sorgulandı [9-10].

Hastaların taburculuk kararlarının verilebilmesi için TIMI, GRACE skorlamaları kullanıldı.

Veriler IBM SPSS (versiyon 20.0) programı ile analiz edildi. Çalışma grubunun tanımlayıcı bilgileri sayı, yüzde, standart sapma, ortalama ile sunuldu.

Verilerin tek değişkenli analizinde Ki kare ve Mann Whitney U testleri kullanıldı. Tek değişkenli analizlerde $p<0.05$ düzeyinde ilişki saptanan değişkenlerle lojistik regresyon modeli (Enter metodu) oluşturuldu. İstatistiki anlamlılık değerliği için $p<0.05$ kabul edildi.

3. Bulgular

Çalışma süresi boyunca acil servise 87320 yetişkin hasta başvurmuş olup bunların 2878'inin (%3,3) travma dışı göğüs ağrısı yakınması mevcuttur. Travma dışı göğüs ağrısı yakınmasıyla başvuran hastaların 2811'i (%97,7) çalışmaya dahil edilmiştir. Hastaların yaşları 51.9±18,8 yıl (aralık: 18-97) idi. Hastaların 1745'i (%62,1) erkek, 1066'sı (%37,9) kadındı. Daha önce koroner anjiografi yapılan hasta sayısı 950 (%33,8) olup, işlem sonrası ilk kez göğüs ağrısı olan hasta sayısı 116 (%4,1) idi. Çalışma grubu hastalarının 1175'inin (%41,8) GA'sı AKS kapsamında değerlendirildi. Hastalardan 60 yaş ve üzerindeki erkeklerde, özgeçmişinde özelliği olanlarda AKS görülme sıklığı daha fazla idi (her biri için $p<0,05$). Çalışma grubunda AKS olan ve olmayan bireylerin demografik, ağrı ve özgeçmiş özelliklerine göre dağılımı Tablo 1'de verilmiştir.

Tablo 1. Çalışma grubunda AKS olan ve olmayan bireylerin demografik, ağrı ve özgeçmiş özelliklerine göre dağılımı.

Özellikler		**n (%)**	**Tanı**		**Istatistiksel Analiz**
			AKS	**Diğer**	**Ki kare; p**
			n (%)	**n (%)**	
Yaş grubu	<40	835 (29.7)	115 (13.8)	720 (86.2)	433.103***
	40-59	911 (32.4)	412 (45.2)	499 (54.8)	
	60-69	497 (17.7)	298 (60.0)	199 (40.0)	
	≥70	568 (20.2)	350 (61.6)	218 (38.0)	
Cinsiyet	Kadın	1066 (37.9)	410 (38.5)	656 (61.5)	
	Erkek	1745 (62.1)	765 (43.8)	980 (56.2)	7.867**
Mevsimler	Yaz	680 (24.2)	249 (36.6)	431 (63.4)	11.971***
	Kış	761 (27.1)	315 (41.4)	446 (58.6)	
	İlkbahar	716 (25.5)	319 (44.6)	397 (55.4)	
	Sonbahar	654 (23.3)	292 (44.6)	362 (55.4)	
Başvuru saat aralığı	02:00-12:00	779 (27.7)	379 (48.7)	400 (51.3)	20.798***
	12:01-01:59	2032 (72.3)	256 (12.6)	1176 (87.4)	
Ağrı özelliği	Tipik	979 (34.8)	653 (66.7)	326 (33.3)	382.860***
	Atipik	1832 (65.2)	522 (28.5)	1310 (71.5)	
Ek yakınma varlığı	Var	2008 (71.4)	1154 (57.5)	854 (42.5)	709.496***
	Yok	803 (28.6)	21 (2.6)	782 (97.4)	
Daha önce benzer yakınma	Evet	1261 (44.9)	864 (68.5)	397 (31.5)	670.995***
	Hayır	1550 (55.1)	311 (20.1)	1239 (79.9)	
Ağrının devam etme durumu	Evet	1611 (57.3)	774 (48.0)	837 (52.0)	60.4691***
	Hayır	1200 (42.7)	401 (33.4)	799 (66.6)	
Risk faktörü	Yok	299 (10.6)	34 (11.4)	265 (88.6)	132.094***
	1 tane	599 (21.3)	75 (38.1)	112 (61.9)	

	≥ 2	1903 (68.1)	1066 (46.0)	1249 (54.0)	
KAG öyküsü	Evet	950 (33.8)	697 (73.4)	253 (26.6)	587.817***
	Hayır	1861 (66.2)	478 (25.7)	1383 (74.3)	
KABG öyküsü	Evet	338 (12.0)	244 (72.2)	94 (27.8)	145.846***
	Hayır	2473 (88.0)	931 (37.6)	1542 (62.4)	
İşlem sonrası ilk ağrı mı?	Evet	116 (4.1)	108 (93.1)	8 (6.9)	130.904***
	Hayır	2695 (95.9)	1067 (39.6)	1628 (60.4)	
AS'e başvurduktan 1 ay sonra benzer yakınması	Evet	459 (16.3)	318 (69.3)	141 (30.7)	170.295***
	Hayır	2352 (83.7)	857 (36.4)	1495 (63.6)	
Benzer yakınması olanların tekrar AS'e başvurma durumu [a]	Evet	206 (44.9)	135 (65.5)	71 (34.5)	2.466
	Hayır	253 (55.1)	183 (72.3)	70 (27.7)	
Ciddi kardiyak patoloji gelişmesi	Evet	66 (2.3)	54 (81.8)	12 (18.2)	44.491***
	Hayır	2745 (97.7)	1121 (40.8)	1624 (59.2)	
Ölüm	Evet	75 (2.7)	47 (62.7)	28 (37.3)	13.791***
	Hayır	2736 (97.3)	1128 (41.2)	1608 (58.8)	
Sonuç	Taburcu-hastane terk-tedavi red	2004 (71.3)	503 (25.1)	1501 (74.9)	800.263***
	Yatış-sevk-ölüm	207 (28.7)	72 (83.3)	135 (16.7)	
Toplam		2811 (100.0)	1175 (41.8)	1636 (58.2)	

**p<0.05; **p<0.01; ***p<0.001; a: Sayılar benzer yakınması olanlar üzerinden verilmiştir.*

Tablo 2. Hastaların göğüs ağrısının tipi ve eşlik eden şikayetlerin dağılımı.

GA'nın tipi	**n (%)***	**GA'na eşlik eden şikayetler**	**n (%)***
Sıkıştırır- Yanıcı	1272 (33.1)	Epigastrik ağrı	722 (17.8)
Bıçak saplanır – Batıcı	1029 (26.8)	Fenalık hissi	658 (16.2)
Nefes almakla artan	578 (15.1)	Bulantı/kusma	534 (13.2)
Pozisyonla değişen	340 (8.9)	Çarpıntı	368 (9.1)
Tanımlanamayan	330 (8.6)	Nefes Darlığı	263 (6.5)
Palpasyonla artan	289 (7.5)	Diğer**	1509 (37.2)
Toplam	3838 (100.0)	Toplam	4054 (100.0)

*: Sayı ve yüzdeler belirtilen cevaplar üzerinden verilmiştir.
**: Bayılayazma-senkop, sırt ağrısı, terleme, ateş

Çalışma grubundaki hastaların 1771'i (%63.0) EKG "normal", 181'si (%6,4) "STEMİ" ve 859'si (%30,6) "herhangi bir tanısal değeri olmayan değişiklikler" olarak değerlendirildi.

İlk incelemede Troponin-T çalışılan 2362 hastanın 715'inde (%30,3) değerler yüksek saptanırken üçüncü saatte Troponin-T değeri çalışılan hastaların (n=1467) 131'inde %20'den fazla değişiklik (%8,9) saptandı.

Hastaların yapılan incelemeleri sonunda 758'inde (%27) unstable anjina pektoris (UAP), 234'ünde NSTEMİ (%8,3) saptandı. Hastaların 1175'inde (%41,8) GA AKS kapsamında değerlendirildi. Hastaların aldıkları tanıların dağılımı Tablo 3'te verilmiştir.

Tablo 3. Hastaların aldıkları tanıların dağılımı

Tanı	**n (%)**
Özgül olmayan göğüs ağrısı	970 (34.5)
UAP	758 (27)
Miyalji	324 (11.5)
NSTEMİ	234 (8.3)
STEMİ	181 (6.4)
Pnomoni	102 (3.6)
Pnomotoraks	13(0.5)
Aort diseksiyonu	12 (0.4)
PTE	12 (0.4)
Diğer	205* (7.3)
Toplam	**2811 (100.0)**

**Abse, akut myelositer lösemi, anksiyete, kalp yetmezliği, akut böbrek yetmezliği, Aort anevrizması, subdural kanama, uterin kanama, AV tam blok, İlaç intoksikasyonu (digoksin), CO intoksikasyonu, gastrit, GİS kanama, gastro-özefagiyal reflü, hiperkalsemi, hiperpotasemi*

Çalışmamızda AKS ile ilişkili olduğu saptanan değişkenlerle (yaş, cinsiyet, ağrı özelliği, ek yakınma varlığı, daha önce benzer yakınma varlığı, ağrının devam etme durumu, risk faktörü, KAG öyküsü, koroner arter by-pass greft (KABG) öyküsü, işlem sonrasında ilk ağrısı olup olmadığı) oluşturulan lojistik regresyon modeli Tablo 4'te verilmiştir.

Tablo 4. AKS ile ilişkili saptanan değişkenlerle oluşturulan lojistik regresyon modeli

Özellikler		**Odds Ratio**	**% 95 Güven Aralığı**
Yaş grubu	<40*	1	-
	40-59*	2.781***	1.940-3.985
	60-69	1.659*	1.072-2.566
	≥70	0.975	0.588-1.615
Cinsiyet	Kadın	1	-
	Erkek	1.299*	1.037-1.626
Mevsimler	Yaz	1	-
	Kış	1.373*	1.007-1.872
	İlkbahar	1.388*	1.013-1.902
	Sonbahar	1.640*	1.191-2.259
Başvuru saat aralığı	12:01-01:59	1	-
	02:00-12:00	1.090	0.855-1.390
Ağrı özelliği	Atipik	1	-
	Tipik (Sıkıştırıcı-yanıcı)	3.805***	3.025-4.787
Ek yakınma varlığı	Yok	1	-
	Var	31.750***	19.928-50.587
Daha önce benzer yakınma	Hayır	1	-
	Evet	4.662***	3.701-5.874
Ağrının devam etme durumu	Hayır	1	-
	Evet	0.896	0.712-1.128
Risk faktörü	Yok	1	-
	1 tane	1.771	0.941-3.335

	≥ 2	1.505	0.921-2.460
KAG öyküsü	Hayır	1	-
	Evet	2.586***	3.149-6.677
KABG öyküsü	Hayır	1	-
	Evet	1.051	0.712-1.550
İşlem sonrası ilk ağrı mı?	Hayır	1	-
	Evet	2.908*	1.283-6.595

*p<0.05; **p<0.01; ***p<0.001

Çalışma grubunda AKS kapsamında değerlendirilen 1175 hastanın 183'ü STEMI (%15.6), 234'ü NSTEMI (%19.9), 758'i UAP (%64.5) olarak tanı almıştır. Hastaların 177'sine KAG yapıldı. KAG yapılan hastaların işleme alınma süreleri 1-1320 dk (22 saat) arasında değişmekte olup ortancası 68.5 dk idi. KAG'ye alınma süresi mesai saatleri içinde başvuranlarda 49 (1-1081) dk; mesai saatleri içinde 73 (20-1320) dk olarak saptanmıştır. KAG'ye alınma süresi mesai saatleri içinde daha düşüktü (z=3.058; p=0.002).

Çalışma grubunu oluşturanların taburculuktan 1 ay sonraki durumları Tablo 5'te verilmiştir.

Tablo 5. Çalışma grubunu oluşturanların taburculuktan 1 ay sonraki durumları

Taburculuktan 1 ay sonra		n (%)
Benzer GA	Evet	459 (16.4)
	Hayır	2346 (83.6)
Benzer yakınma ile hastaneye başvurma*	Evet	206 (44.9)
	Hayır	253 (55.1)
Ciddi kardiyak patoloji gelişmesi	Evet	61 (2.2)
	Hayır	2744 (97.8)
Ölüm	Evet	69 (2.5)
	Hayır	2736 (97.5)
Ölüm**	Taburcu olanlarda	18 (26.1)
	Taburcu olmayanlarda	51 (73.9)
Toplam		2811 (100.0)

*: Sayılar benzer GA olan hastalar üzerinden verilmiştir.

**: Acil servisten taburcu olan ve olmayan (yatış-sevk vs.) hastalardaki sayılardır.

4. Tartışma ve Sonuç

GA'nın ayırıcı tanısı hızlı ve doğru olarak yapılamadığında mortalite ve morbiditesinin yüksek olması ayırıcı tanının önemini daha da artırmaktadır. GA, Dünya genelinde ölümlerin birinci nedeni olan kardiyovasküler hastalıkların önemli belirtileri arasındadır [11,12]. Çalışmamızda travma dışı göğüs ağrısı ile AS'e başvuran hastaların özelliklerinin değerlendirilmesi amaçlandı.

Çalışma süresince AS'e yapılan başvuruların %3,5'i travma dışı göğüs ağrısı nedeniyle idi. Amerika Birleşik Devletleri'nin 2015 Ulusal Hastane Ambulatuvar Tıbbi Bakım Araştırması'nda 15 yaş üzerindeki bireylerin AS'e başvuru şikayetlerinin %5,3'ünün GA olduğu rapor edilmiştir [13]. Almanya'da birinci basamakta yapılan başvuruların incelendiği araştırmada tüm baş vurular arasında göğüs ağrısının %0,7 olduğu raporlanmıştır [14]. Çalışma yapılan toplumların hastalık yüklerinin farklı olması ve genel olarak GA'nın ciddi hastalıkların belirtisi olabileceği düşüncesi kişileri AS'e başvuru yapmaya yöneltmesi gibi nedenler farklı sonuçların bildirilmesinin nedenleri arasında sayılabilir. Ek olarak araştırmaya hastaların araştırmaya dahil edilme kriterlerinin aynı olmaması acil servis başvuruları arasında GA sıklığının farklı çıkmasına katkıda bulunmuş olabilir.

Bu çalışmada hastaların yaklaşık olarak üçte birinin ağrısının kardiyak iskemi için tipik olduğu saptanırken atipik göğüs ağrısı tarifleyen hastaların ise yaklaşık dörtte birine AKS tanısı konulmuştur. Ek olarak çalışmamızda AKS tanısı alan kadınların yarısı atipik GA tariflemekte iken erkeklerde bu sıklık daha düşüktü (p=0.003). Coşkun ve arkadaşlarının yaptıkları çalışmada da göğüs ağrısı olanların %36'sının tipik vasıfta olduğu ve atipik ağrı tarifleyen hastaların ise %6,9'una AKS tanısının konulduğu bildirilmiştir [15]. Walker ve arkadaşlarının genç erişkinlerde yaptığı çalışmada

ise hastaların %42'sinin GA'nın baskı/sıkıştırıcı tarzda olduğu bildirilmiştir [8]. Hastaların GA vasfını kendi algılarına göre tarif etmesi ve hastaların mevcut kronik hastalıkları nedeniyle göğüs ağrısını farklı hissetmesi ve tam olarak dile getirememesi literatürde farklı sonuçların olmasına neden olmuş olabilir.

GA ile başvuru yapan hastaların en sık aldığı tanı AKS olup ardından özgül olmayan göğüs ağrısı ve miyalji tanıları gelmekte idi. AKS kapsamında ise en sık UAP saptandı. Knockaert ve arkadaşlarının yaptıkları benzer çalışmada da GA olan hastaların en sık aldığı tanının AKS, 2. sırada akciğer hastalıkları ve 3. sırada ise somatizasyon bozukluklarının olduğu ve AKS kapsamın en sık MI olduğu bildirilmiştir [16]. Bösner ve arkadaşlarının Almanya'da pratisyen hekimlere göğüs ağrısı ile başvuran hastalar üzerinde yaptıkları çalışmada hastaların en sık aldıkları tanının kas-iskelet sistem hastalıkları olduğu, psikojenik bozukluklar ile iskemik kalp hastalıklarının sıklığının birbirine yakın olduğu rapor edilmiştir [14]. GA ciddi hastalıklarının belirtisi olabileceği için hastalar genellikle 2-3. basamak hastanelere başvurmayı tercih etmektedirler. Bu nedenle hastane tabanlı yapılan çalışmalarda GA etyolojisinde AKS daha sık görülmesi olasıdır.

Kadınlarda kardiyovasküler sistem (KVS) hastalıkları erkeklere göre daha ileri yaşlarda görülmekte olup kadınların bu hastalıklara bağlı kaybettiği yaşam yılları daha azdır [17]. Çalışmamızda hem genel olarak AKS hem de MI görülme riski erkeklerde kadınlara göre yaklaşık olarak 1,5 kat daha fazlaydı. Türkiye kronik hastalıklar ve risk faktörleri sıklığı 2013 çalışmasında genel olarak GA sıklığının kadınlarda daha fazla olduğu ancak KAH'nin ve MI'nın görülme sıklığının erkeklerde daha fazla olduğu rapor edilmiştir. Türkiye Sağlık Araştırmasında ise KAH görülme sıklığının kadınlar ve erkeklerde benzer olduğu ancak enfarktüs sıklığının erkeklerde daha fazla olduğu bildirilmiştir [12]. Coşkun ve arkadaşlarının yaptıkları çalışmada da benzer sonuç rapor edilmiştir [15].

Mevsimsel değişim ile AKS görülmesi arasında ilişki için farklı teoriler öne sürülmekle beraber kesin kabul görmüş bir teori yoktur. Yaz aylarında vazodilatasyona bağlı kalbin hem ön yükünün hem de art yükünün azalması gerek enfeksiyon görülme sıklığının gerekse enfektif ajanların değişmesi, insanların daha rahat bir yaşam içerisinde olmalarından dolayı katekolamin deşarjının az olması gibi sebepler bu sonucun nedenleri arsında sayılabilir. Çalışmamızda da literatürü destekler tarzda yaz mevsimine göre diğer mevsimlerde başvuran hastalarda AKS sıklığı yaklaşık 1,5 kat daha fazla idi. Yapılan farklı çalışmalarda benzer sonuçlar bildirilmiştir [18-20].

İskemik kardiyak hastalıklar semptomların başlangıç saatinden bağımsız olarak gece-gündüz döngüsüne göre değişkenlik gösterebilmektedir. Yapılan farklı çalışmalarda AKS görülmesinin zirve yapma değerleri farklılıklar göstermekle beraber saat aralığı genellikle benzer olarak bildirilmiştir [21-22]. Çalışmamamızda AKS görülme sıklığı gece saatleri ile günün erken saatleri arasında daha fazla saptandı. Boari ve arkadaşlarının yaptıkları çalışmada da hem MI hem diğer iskemik kalp hastalıklarının gece-gündüz döngüsü gösterdiği ve sabah uyanıp aktiviteye başladıktan sonraki birkaç saat içinde sıklığının arttığı bildirilmiştir [23]. Sabah saatlerinde postürle ilişkili olarak trombosit agregasyonu artmaktadır. Dolayısıyla artan trombotik eğilim iskemik kalp hastalıkları gibi trombotik olayların ortaya çıkmasını kolaylaştıracaktır. Bu durum gece geç saatlerden sonra ve sabah erken saatlerinde AKS görülme sıklığının artmasının nedenlerinden olabilir. Ek olarak genetik faktörlerde gece-gündüz döngüsü üzerinde etkili olabilmektedir [24].

Acil servise GA ile başvuran hastaların başvuru anında muayenelerinde ve laboratuvar bulgularında anormallik saptanmayabilir. Bu durum bazı hastaların yanlış ya da eksik tanı almasına neden olabilmektedir. Bu nedenle hastaların birden fazla risk faktörü bir arada değerlendirilerek hasta risk skoru belirlenerek taburculuk ya da takip edilme kararı verilebilmektedir. TIMI ve GRACE skorlamaları bu amaçla en yaygın kullanılan risk skorlama yöntemlerindendir. Çalışmamızda acil servise başvurduklarında dört hastadan üçü TIMI skoruna göre ve iki hastadan birinin GRACE skoruna göre düşük riskli grupta idi. AKS tanısı alan hastalarda ise her iki skorlamaya göre de sadece dört hastadan birisi düşük riskli grupta idi. TIMI ve GRACE skorlamalarına göre yüksek riskli grupta olanlarda AKS görülme sıklığı ve hastanede kalış süreleri daha fazla idi. Ramsay ve arkadaşlarının yaptıkları çalışmada GA ile AS'e başvuru anında hastaların %21'i TIMI, %40'ı ise GRACE skorlamasına göre düşük riskli grupta idi. Aynı çalışmada çalışmamıza benzer şekilde yüksek riskli grupta yer alan hastalarda AKS görülme sıklığının ve hastanede kalış sürelerinin daha fazla olduğu bildirilmiştir [5].

Çalışma grubunda taburculuktan sonraki 1 aylık süreçte ciddi kardiyak patoloji ve/veya ölüm görülme olasılığı %2,8 idi. Benzer GA şikâyeti ile AS'ye başvurma sıklığı %7 idi. TIMI skorlamasında

yüksek riskli olanlarda %18,4'ünde ve GRACE skorlamasında yüksek riskli olanlarda ise %7,7'sinde ciddi kardiyak patoloji ve/veya ölüm görüldü. Edinburgh'ta 2006 yılında yapılan çalışmada taburculuktan sonra hastaların %7,2'sinde ciddi kardiyak patoloji ve/veya ölüm görüldüğü ve GRACE ve TIMI skorlamalarının bu riski ön görmesinin anlamlı olduğu rapor edilmiştir. Ek olarak aynı çalışmada benzer GA ile tekrar başvuru sıklığının yaklaşık %10 olduğu bildirilmiştir [3]. Pollack ve arkadaşlarının yaptıkları çalışmada TIMI skorlamasında saptanan risk faktörlerinin sayısı arttıkça hastaların taburculuktan 1 ay sonra yaşadıkları olayların (ölüm, MI, KABG, KAG) saptanmasının arttığı gösterilmiştir [25]. İngiltere'de yapılan diğer bir çalışmada da GRACE ve TIMI skorlamalarında risk faktörleri arttıkça taburculuktan 1 ay sonraki dönemde kardiyak olay görülme sıklığının attığı bildirilmiştir [7].

Sonuç olarak kardiyak ve kardiyak olmayan pek çok hastalığın semptomu olan GA, AS'ye en sık başvuru nedenleri arasındadır. Çalışmamız süresince AS'ye yapılan başvuruların %3,5'i travma dışı göğüs ağrısı nedeniyle idi. GA ile başvuru yapan hastaların en sık aldığı tanı AKS olup ardından özgül olmayan göğüs ağrısı ve miyalji tanıları gelmekte idi. AKS kapsamında ise en sık UAP saptandı. TIMI ve GRACE skorlamalarına göre yüksek riskli grupta olanlarda AKS görülme sıklığı daha fazla idi.

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Obsesif Kompulsif Bozukluk ve Yeme Bozukluğu Tanısı ile İzlenen Ergenlerde Ortoreksiya Nervoza Belirtilerinin Karşılaştırılması

Factors Affecting Peroperative Bleeding Amount and Need for Blood Transfusion in Retropubic Radical Prostatectomy Operation

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Onam: Yazarlar çalışma için katılımcılardan Bilgilendirilmiş Gönüllü Formu aldıklarını beyan etmişlerdir.
Telif Hakkı Devir Formu: Tüm yazarlar tarafından Telif Hakkı Devir Formu imzalanmıştır.
Hakem Değerlendirmesi: Hakem değerlendirmesinden geçmiştir.
Yazar Katkı Oranları: Çalışmada her iki yazar da eşit oranda katkı sunmuştur.
Çıkar Çatışması Bildirimi: Yazarlar çıkar çatışması olmadığını beyan etmişlerdir.
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Abstract: Orthorexia Nervosa (ON) describes the excessive devotion to healthy eating and lifestyle or obsessive selection of healthy foods. Although it has been reported that there is overlap between ON and obsessive-compulsive disorder (OCD) and eating disorders (ED), it is not clear which disease spectrum ON symptoms overlap more. In this study, we aimed to examine ON symptoms in adolescents diagnosed with OCD and ED and to compare ON symptoms in both groups. Our study was conducted on 38 adolescents between the ages of 12-18 diagnosed with OCD or ED. To evaluate the patients' eating attitudes, the "Eating Attitudes Test (EAT-40)", to measure orthorexia symptoms, the "Ortho-11 Scale" and to measure anxiety/depression and obsessive-compulsive disorder symptoms, the "Anxiety and Depression Scale in Children-Revised (RCADS) child form" were filled out. The parents of the adolescents filled out the "Sociodemographic Data Form" and the "RCADS parent form". ORTO-11 score was found to be significantly lower and EAT-40 score was found to be higher in adolescents with ED compared to adolescents with OCD. A negative moderate correlation was found between the EAT-40 scale and the ORTO-11 scale and was statistically significant ($r=-0.613$, $p<0.001$). In the logistic regression analysis, the most important predictor for orthorexia tendency was found to be the EAT-40 score ($p=0.010$). In the linear regression analysis of EAT-40 and ORTO-11 scales; EAT-40 score was found to be a significant predictor of ORTO-11 score. In our study, ON symptoms were investigated in adolescents and orthoretic tendencies were compared in two different disease groups. According to our results, we think that there is more and stronger evidence for the classification of ON within eating disorders.
Keywords: Orthorexia Nervosa, Adolescent, Eating Disorders, Obsessive Compulsive Disorder, Anorexia Nervosa

Özet: Ortoreksiya Nervoza (ON) sağlıklı beslenme ve sağlıklı yaşam tarzına aşırı düşkünlük veya takıntılı bir biçimde sağlıklı yiyecekler seçme durumunu tanımlamaktadır. ON ile obsesif kompulsif bozukluk (OKB) ve yeme bozukluğu (YB) arasında örtüşmeler olduğu bildirilse de ON belirtilerinin hangi hastalık spektrumuyla daha fazla örtüşme sağladığı net değildir. Biz bu çalışmamızda; OKB ve YB tanısı olan ergenlerde ON belirtilerini incelemeyi ve iki grup arasında karşılaştırmayı amaçladık. Çalışmamız OKB veya YB tanılı 12-18 yaş aralığındaki 38 adölesan üzerinde gerçekleştirilmiştir. Hastaların yeme tutumunu değerlendirmek için "Yeme Tutum Testi (YTT-40)", ortoreksiya belirtilerini ölçmek için "Orto-11 Ölçeği" ve anksiyete/depresyon ve obsesif kompulsif bozukluk belirtilerini ölçmek için "Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş (ÇADÖ-Y) çocuk formu" doldurtuldu. Adolesanların ebeveynlerine ise "Sosyodemografik Veri Formu", "ÇADÖ-Y ebeveyn formu" doldurtuldu. YB'li ergenlerde OKB'li ergenlere göre anlamlı şekilde ORTO-11 skoru düşük, YTT-40 skoru yüksek saptandı. YTT-40 ölçeği ile ORTO-11 ölçeği arasında negatif orta derecede bir korelasyon saptandı ve istatistiksel olarak anlamlıydı ($r=-0.613$, $p<0.001$). Lojistik regresyon analizinde ortoreksiya eğilimi için en önemli prediktörün YTT-40 skoru olduğu saptandı ($p=0.010$). YTT-40 ve ORTO-11 ölçeklerinin lineer regresyon analizinde; YTT-40 puanının, ORTO-11 skorunun anlamlı bir yordayıcısı olduğu saptandı. Çalışmamızda ON belirtileri adölesanlar üzerinde araştırılmış ve iki farklı hastalık grubunda ortoretik eğilimler karşılaştırılmıştır. Sonuçlarımıza göre ON'nin yeme bozukluklarının içerisinde sınıflandırılması için daha fazla ve güçlü kanıt olduğunu düşünmekteyiz.
Anahtar Kelimeler: Ortoreksiya Nervoza, Adölesan, Beslenme ve Yeme Bozuklukları, Obsesif Kompulsif Bozukluk, Anoreksiya Nervoza

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1. Giriş

Ortoreksiya Nervoza (ON) tanımı 1997 yılında Bratman tarafından ortaya atılmıştır. Sağlıklı beslenme ve yaşam tarzına aşırı düşkünlük veya takıntılı bir biçimde sağlıklı yiyecekler seçme durumunu tanımlamaktadır (1). Bu takıntılı ilgi, kişinin yaşam kalitesini önemli ölçüde bozabilir ve gıda tüketiminin tamamen bırakılmasına kadar giden ciddi diyet kısıtlamalarına sebep olabilir (2). Genel popülasyonda ON'nin ortalama yaygınlığı %6.9 olarak belirtilirken bu oran sanatçılar ve sağlık çalışanları gibi yüksek riskli gruplarda %35-57.8 olarak bildirilmiştir (3). ON, Diagnostic and Statistical Manual of Mental Disorders (DSM-5) gibi mevcut psikiyatrik tanı sınıflandırma sistemlerinde tanımlanmamıştır (3). Bu bozukluğun tanınması ve tanımlanmasında kullanılabilecek önerilen belirtiler olsa da henüz yerleşik tanı kriterleri yoktur. Literatürde ON'nin basit bir davranışsal fenomen olarak mı yoksa psikiyatrik bir bozukluk olarak mı tanımlanması gerektiği yönünde tartışmalar devam etmektedir.

Anoreksiya nevroza (AN), obsesif kompulsif bozukluk (OKB), bedensel belirti bozukluğu, hastalık anksiyetesi bozukluklarının ON ile ortak yönleri olduğu varsayılmaktadır. ON'yi ruhsal bir bozukluk spektrumu içerisine dahil etmeyi öneren çalışmaların sonuçlarında, yeme bozuklukları (YB) ve OKB ile ON arasında ciddi bir örtüşme olduğu vurgulanmaktadır (4). Bazı yazarlar ON'nin bir YB olarak değerlendirilmesi gerektiğini, bazıları ise OKB spektrumu içerisinde sınıflandırılması gerektiğini belirtmektedir (5). ON'nin geçerli tanı kriterlerinin olmaması, bu durumun ayrı bir ruhsal bozukluk mu, AN gibi yeme bozukluklarının bir tipi mi veya OKB'nin bir alt tipi mi olduğunu belirlemeyi zorlaştırmaktadır (5).

ON ile YB semptomları arasında kayda değer örtüşmeler olduğu bildirilmiştir (6). Ancak ON'de görülen davranış, zayıflamaya yönelik bir kısıtlama davranışı değil, aşırı saf ve sağlıklı beslenme şekline dayanan bir davranıştır. Bu kişiler YB (AN veya bulimia) olan hastaların aksine güzel görünmek için değil, kusursuz ve sağlıklı bir diyet uygulama takıntısından dolayı zayıflamaktadırlar. ON'li kişilerin YB'den farklı olarak yiyecek miktarından daha çok yiyecek kalitesine odaklandıkları görülse de, temel besin eksikliğine bağlı yetersiz beslenme, anemi, anormal kardiak fonksiyonlar gibi YB ile aynı tıbbi komplikasyonlarla karşılaşması görülen bir durumdur (4, 7).

Literatürde ON ile OKB arasındaki ilişki ve örtüşmeler de araştırılmıştır. ON'li bireylerin tıpkı OKB hastaları gibi katı kurallar içerisinde sağlıklı besinleri seçmek, hazırlamak ve yemek için yoğun çaba sarfettikleri, zaman harcadıkları ve bu durumun sosyal işlevlerinde bozulmalara neden olduğu gösterilmiştir (8,9). Yapılan çalışmalarda sağlıklı kabul edilen genel popülasyonda saptanan obsesif-kompulsif semptomların ON belirtileri ile ilişkili olduğu gösterilmiştir (9,10). OKB ile ON'nin bir diğer örtüşmesi ise; OKB'li bireylerde tekrarlayıcı davranışları gerçekleştiremediklerinde ortaya çıkan felaketleştirme ve yoğun kaygının, ortoreksik bireylerde de sağlıklı beslenemediğini düşündüğü durumlarda ortaya çıkmasıdır. ON'li bireyler sağlıklı beslenemediklerini düşündüklerinde yoğun bir suçluluk duygusu da hissedebilirler (11).

Mevcut kanıtlar ON ile OKB ve YB arasında bir ilişki ve örtüşme olduğunu düşündürmektedir. Ancak net olarak sınıflandırılamayan bu hastalığın belirtilerinin hangi hastalık spektrumuyla daha fazla örtüşme sağladığı net değildir. Biz bu çalışmamızda; OKB ve YB tanısı olan ergenlerde ON belirtilerini karşılaştırmalı olarak incelemeyi ve ergenlerin klinik ve demografik özelliklerinin ON ile ilişkisini araştırmayı amaçladık.

2. Gereç ve Yöntem

2.1. Katılımcılar ve Çalışma Prosedürü

Çalışma evreni Mart 2021-Eylül 2021 tarihleri arasında Afyonkarahisar Sağlık Bilimleri Üniversitesi Hastanesi Çocuk Psikiyatrisi bölümüne başvuran OKB veya yeme bozukluğu tanılı 12-18 yaş aralığındaki toplam 38 adölesandan oluşmaktadır. Tüm katılımcılara yarı yapılandırılmış klinik görüşmede Okul Çağı Çocukları için Duygusal Bozukluklar ve Şizofreni için Çocuk Programı-Şimdi ve Yaşam Boyu versiyonu-Türkçe versiyonu (ÇDŞG-ŞY-T) uygulandı (12, 13). Bu görüşme diğer psikiyatrik hastalıkları belirlemek için yapıldı. Dışlama kriterleri arasında nörolojik hastalıklar, mental retardasyon, organik beyin hasarı, diğer akut veya kronik fiziksel hastalıklar yer almaktaydı.

Araştırma süresince OKB veya YB tanısı olan 42 adolesan ve ailesi ile görüşüldü. Yeme bozukluğuna neden olabilecek metabolik bir hastalığa sahip olan veya gastrointestinal sistem patolojisi bulunan 4 hasta çalışma dışı bırakıldı. Hastaların yeme tutumunu değerlendirmek için "Yeme Tutum Testi

(YTT-40)", ortoreksiya belirtilerini ölçmek için "ORTO-11 Ölçeği" ve anksiyete/depresyon ve obsesif kompulsif bozukluk belirtilerini ölçmek için "Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş (ÇADÖ-Y) çocuk formu" doldurtuldu. Adolesanların ebeveynlerine ise "Sosyodemografik Veri Formu", "Çocuklarda Anksiyete ve Depresyon Ölçeği (ÇADÖ-Y) ebeveyn formu" doldurtuldu.

Çalışmanın ilk aşamasında, YB ve OKB grupları arasında demografik ve klinik veriler ile ölçek skorları karşılaştırıldı. Daha sonra ortoretik eğilime göre sınıflandırılan adölesanlarda, ortoreksiya eğilimine etki eden faktörler araştırıldı.

2.2. Etik Kurul Onayı

Bu araştırma için Afyonkarahisar Sağlık Bilimleri Üniversitesi Klinik Araştırmalar Etik Kurulundan 05.03.2021 tarih ve 2021/159 Karar No ile etik onay alındı. Çalışmaya katılmayı kabul eden katılımcılar ve aileleri yazılı bilgilendirilmiş onam vermiş ve tüm çalışma yöntemleri Helsinki Bildirgesi'ne uygun olarak yürütülmüştür.

2.3. Sosyodemografik Veri Formu

Daha önceki çalışmalardan örnek alınarak araştırmacılar tarafından oluşturulan bu form; katılımcının yaşı, cinsiyeti, eğitim durumu, ek psikiyatrik tanısı, ailede psikiyatrik hastalık öyküsü, sigara, alkol ve madde kullanımı, diyet uygulama durumu gibi bilgileri içermektedir. Sosyodemografik veri formu araştırmacı eşliğinde ebeveynler ve gençlerden alınan bilgiler ile doldurulmuştur.

2.4. Yeme Tutum Testi (YTT-40)

YTT-40 altılı likert tipte, toplam 40 maddeden oluşan self-report bir ölçektir. Normal bireylerde var olan yeme davranışındaki olası bozuklukların taranmasında ve özellikle AN gibi yüksek risk grubunu oluşturan bireylerde kullanılmaktadır. Otuz ve üzeri puan alan kişilerin AN başta olmak üzere yeme bozukluğu açısından yüksek riskli grupta yer aldığı kabul edilmektedir (14). Ölçeğin Türkçe geçerlik ve güvenilirliği Savaşır ve ark. tarafından yapılmıştır ve Cronbach alfa değeri 0,70 olarak saptanmıştır (15).

2.5. Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş (ÇADÖ-Y)

ÇADÖ-Y dörtlü likert tipte toplam 47 maddeden oluşan self-report bir ölçektir. DSM tanı sistemini temel alarak 7 maddede sosyal anksiyete bozukluğu (SAB), 9 maddede seperasyon anksiyetesi (SA), 6 maddede yaygın anksiyete bozukluğu (YAB), 9 maddede panik bozukluk (PB), 6 maddede obsesif kompulsif bozukluk (OKB) ve 10 maddede majör depresif bozukluk (MDB) taranmaktadır. Ölçeğin çocuk ve ebeveyn formu bulunmaktadır (16). Ölçeklerin dilimizde geçerlilik ve güvenilirlik çalışması Görmez ve ark. tarafından yapılmıştır (17, 18).

2.6. ORTO-11 Ölçeği

Orijinal haliyle ORTO-15 ölçeği, Donini ve arkadaşları tarafından geliştirilen ON eğilimini değerlendirmek için düzenlenen 15 maddelik bir kendini değerlendirme aracıdır (10). Ölçeğin Türkçe geçerlilik ve güvenilirlik çalışması Arusoğlu ve arkadaşları tarafından yapılmıştır ve Cronbach alfa katsayısı 0,62 olarak belirlenmiştir (9). Ölçeğin Türkçe'de kullanımı için 11 madde belirlenmiş ve ORTO-11 şeklinde kullanımı uygun bulunmuştur. ON için ayırt edici olduğu düşünülen cevaplara "1", normal yeme davranışı eğilimini gösteren cevaplara "4" puan verilmektedir. Düşük puanlar ortorektik eğilimi yansıtmaktadır. Çalışmamızda ORTO-11 ölçeğinin değerlendirilmesi için kullanılan kesim noktası, ölçeğin Türkçe'ye uyarlama çalışmasında kullanılan yöntemle, %25'lik dilimde 21 puan olarak belirlenmiştir (9). Bu değerin altındaki (<21) hastalar ortoretik eğilimli olarak değerlendirilmiştir.

2.7. İstatistiksel Analiz

Veri analizi için bir istatistik programı (Windows için SPPS, v21.) kullanılmıştır. Verilerin normal dağılımı Kolmogorov-Smirnov testi, histogram ve Skewness-Kurtosis katsayıları ile değerlendirildi. Nominal ve ordinal değişkenler Pearson ki-kare testi ile karşılaştırıldı. Bu veriler sayı ve yüzdelikler ile verildi. Değişkenler arası ilişki Pearson korelasyon testi ile incelendi. Gruplar arası parametrik değişkenlerin karşılaştırması Student t testi ile yapıldı. Yüksek ortoreksiya riskini (ORTO-11 Score<21) öngörmedeki bağımsız prediktörler enter yöntemi ile Binary lojistik regresyon analizi kullanılarak incelendi. Model uyumu için Hosmer-Lemeshow testi kullanıldı. Tek değişkenli bir lineer regresyon modeli kullanılarak YTT-40 skorunun ORTO-11 skoruna bağımsız etkileri incelendi. Model uyumu gerekli rezidüel ve uyum istatistikleri kullanılarak incelendi. $p<0,05$ değeri istatistiksel olarak anlamlı kabul edildi.

2.8. Tablolar

Tablo 1. OKB ve YB gruplarının demografik, klinik özellikleri ve ölçek puanlarının karşılaştırması

	OKB n=21 Ort±SS	**YB n=17 Ort±SS**	**p**
Yaş	14.86±1.79	15.24±1.30	0.472
Cinsiyet (n %)			
Kadın	13 (61.9)	17 (100)	**0.005**
Erkek	8 (38.1)	0 (0)	
Öğrenim Durumu (n %)			
Ortaokul	10 (47.6)	3 (17.6)	0.086
Lise	11 (52.4)	14 (82.4)	
Ek Tanı (n %)			
Var	10 (47.6)	13 (76.5)	0.100
Yok	11 (52.4)	4 (23.5)	
Ailede Ruhsal Bozukluk (n %)			
Yok	15 (71.4)	17 (100)	**0.024**
Var	6 (28.6)	0 (0)	
Diyet (n %)			
Hayır	15 (71.4)	1 (5.9)	**<0.001**
Evet	6 (28.6)	16 (94.1)	
Düzenli Spor (n %)			
Hayır	16 (76.2)	13 (76.5)	0.984
Evet	5 (23.8)	4 (23.5)	
Sosyal Medya Beslenme İçeriği Takip (n %)			
Hayır	18 (85.7)	7 (41.2)	**0.006**
Evet	3 (14.3)	10 (58.8)	
Beslenme Eğitimi (n %)			
Hayır	15 (71.4)	5 (29.4)	**0.021**
Evet	6 (28.6)	12 (70.6)	
ORTO-11	30.10±6.39	23.47±8.47	**0.009**
YTT-40	19.05±11.29	41.29±23.85	**0.001**
ÇADÖ-Y (çocuk formu)			
SA	3.19±1.23	3.94±1.43	0.079
YAB	4.24±2.14	5.94±3.26	0.061
PB	4.95±2.61	7.00±5.13	0.120
SAB	10.29±5.24	11.06±4.93	0.645
OKB	8.00±3.70	5.47±2.12	**0.017**
MDB	8.33±2.65	11.59±7.07	0059
Toplam anksiyete skoru	30.38±8.62	33.35±12.22	0.386
Toplam ölçek skoru	38.71±8.83	45.00±18.37	0.174
ÇADÖ-Y (ebeveyn formu)			
SA	3.38±1.49	4.24±2.38	0.186
YAB	4.62±1.96	4.18±1.97	0.495
PB	5.62±2.94	4.71±2.39	0.309
SAB	8.29±4.39	7.88±2.71	0.743
OKB	7.00±3.24	5.06±2.46	**0.049**
MDB	8.48±2.90	7.94±4.25	0.649
Toplam anksiyete skoru	29.24±9.60	26.06±6.27	0.247
Toplam ölçek skoru	37.71±11.83	34.00±8.91	0.292

(OKB: Obsesif Kompulsif Bozukluk, YB: Yeme Bozukluğu, YTT-40: Yeme Tutum Testi, ÇADÖ-Y: Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş, SA: Seperasyon aksiyetesi, YAB: Yaygın anksiyete bozukluğu, PB: Panik bozukluk, SAB: Sosyal anksiyete bozukluğu, OKB: Obsesif kompulsif bozukluk, MDB: Major depresif bozukluk)

Tablo 2. Orto-11 puanı kesme değerine göre grupların demografik, klinik özellikleri ve ölçek puanlarının karşılaştırması

	ORTO-11 skoru ≥21 n=24 Mean±SD	**ORTO-11 skoru <21 n=14 Mean±SD**	**p**
Yaş	14.75±1.64	15.50±1.40	0.162
Grup (n %)			
OKB	17 (70.8)	4 (28.6)	**0.018**
YB	7 (29.2)	10 (71.4)	
Cinsiyet (n %)			
Kadın	16 (66.7)	14 (100)	**0.017**
Erkek	8 (33.3)	0 (0)	
Öğrenim Durumu (n %)			
Ortaokul	10 (47.1)	3 (21.4)	0.294
Lise	14 (58.3)	11 (78.6)	
Ek Tanı (n %)			

Var	13 (54.2)	10 (71.4)	0.329
Yok	11 (45.8)	4 (28.6)	
Ailede Ruhsal Bozukluk (n %)			
Yok	18 (75)	14 (100)	0.067
Var	6 (25)	0 (0)	
Diyet (n %)			
Hayır	16 (66.7)	0 (0)	**<0.001**
Evet	8 (33.3)	14 (100)	
Düzenli Spor (n %)			
Hayır	21 (87.5)	8 (57.1)	0.052
Evet	3 (12.5)	6 (42.9)	
Sosyal Medya Beslenme İçeriği Takip (n %)			
Hayır	20 (83.3)	5 (35.7)	**0.005**
Evet	4 (16.7)	9 (64.3)	
Beslenme Eğitimi (n %)			
Hayır	17 (70.8)	3 (21.4)	**0.006**
Evet	7 (29.2)	11 (78.6)	
ORTO-11	32.54±4.10	15.50±1.40	**<0.001**
YTT-40	19.33±14.47	45.57±20.38	**<0.001**
ÇADÖ-Y (çocuk formu)			
SA	3.42±1.41	3.71±1.13	0.507
YAB	4.92±2.56	5.14±3.25	0.814
PB	6.00±3.95	5.64±4.27	0.796
SAB	9.83±5.45	12.00±4.11	0.207
OKB	7.71±3.78	5.43±1.55	**0.039**
MDB	8.79±4.63	11.50±6.08	0.131
Toplam anksiyete skoru	31.58±10.41	31.93±10.62	0.923
Toplam ölçek skoru	40.42±13.21	43.43±15.77	0.532
ÇADÖ-Y (ebeveyn formu)			
SA	3.83±1.65	3.64±2.46	0.778
YAB	4.54±2.08	4.21±1.76	0.625
PB	5.13±3.20	5.36±1.64	0.803
SAB	8.00±4.40	8.29±2.12	0.822
OKB	6.67±3.35	5.21±2.22	0.158
MDB	7.79±3.31	9.00±3.88	0.315
Toplam anksiyete skoru	28.46±10.03	26.71±4.17	0.541
Toplam ölçek skoru	36.25±12.53	35.71±6.71	0.884

(OKB: Obsesif Kompulsif Bozukluk, YB: Yeme Bozukluğu, YTT-40: Yeme Tutum Testi, ÇADÖ-Y: Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş, SA: Seperasyon aksiyetesi, YAB: Yaygın anksiyete bozukluğu, PB: Panik bozukluk, SAB: Sosyal anksiyete bozukluğu, OKB: Obsesif kompulsif bozukluk, MDB: Major depresif bozukluk)

Tablo 3. Hastaların yaş, ORTO-11, YTT-40, ÇADÖ-Y çocuk ve ebeveyn toplam anksiyete ve toplam skorlarının korelasyon analizi

		Yaş (yıl)	**ORTO-11**	**YTT-40**	**ÇADÖ-Y Toplam anksiyete (çocuk)**	**ÇADÖ-Y Toplam skoru (çocuk)**	**ÇADÖ-Y Toplam anksiyete (ebeveyn)**	**ÇADÖ-Y Toplam skor (ebeveyn)**
Yaş (yıl)	r							
	p							
ORTO-11	r	-0.351						
	p	**0.031**						
YTT-40	r	0.425	-0.613					
	p	**0.008**	**<0.001**					
ÇADÖ-Y Toplam anksiyete (çocuk)	r	0.005	-0.022	0.458				
	p	0.974	0.894	**0.004**				
ÇADÖ-Y Toplam skoru (çocuk)	r	0.107	-0.123	0.580	0.949			
	p	0.522	0.464	**<0.001**	**<0.001**			
ÇADÖ-Y Toplam anksiyete (ebeveyn)	r	0.099	0.199	-0.028	0.341	0.225		
	p	0.556	0.230	0.870	**0.036**	0.174		
ÇADÖ-Y Toplam skor (ebeveyn)	r	0.144	0.113	0.127	0.477	0.404	0.960	
	p	0.389	0.501	0.447	**0.002**	**0.012**	**<0.001**	

(YTT-40: Yeme Tutum Testi, ÇADÖ-Y: Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş)

Tablo 4. Ortoreksiya eğilimine etki eden faktörlerin lojistik regresyon analizi

Risk Faktörü	Ortoreksiya Eğilimi (ORTO-11 total score<21)	
	OR (95% GA)	**p value**
Yaş (yıl)	1.052 (0.280-3.950)	0.940
Öğrenim durumu	0.221 (0.001-34.525)	0.558
Ek tanı varlığı	0.305 (0.011-8.400)	0.482
YTT-40 Skoru	1.199 (1.044-1.377)	**0.010**
ÇADÖ-Y toplam anksiyete (çocuk)	0.774 (0.328-1.824)	0.558
ÇADÖ-Y toplam skoru (çocuk)	1.224 (0.631-2.375)	0.550
ÇADÖ-Y toplam anksiyete (ebeveyn)	1.039 (0.650-1.662)	0.871
ÇADÖ-Y toplam skoru (ebeveyn)	0.806 (0.528-1.230)	0.317

(OR: Odds Ratio, GA: güven aralığı, YTT-40: Yeme Tutum Testi, ÇADÖ-Y: Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş)

Tablo 5. YTTT-40 skoru ile ORTO-11 skoru arasındaki lineer regresyon analizi

Değişkenler	B	Std. Hata	β	t	p	95% Güven Aralığı
(Bağımlı Değişken)	33.925	1.792	-	18.936	<0.001	30.292 to 37.559
YTT-40 Skoru	-0.234	0.050	-0.613	-4.660	**<0.001**	-0.336 to -0.132
Bağımlı değişken: ORTO-11 Skoru **R:0.613 R^2: 0.376 F: 21.718 p<0.001 Durbin-Watson: 1.785**						

(YTT-40: Yeme Tutum Testi, ÇADÖ-Y: Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş)

3. Bulgular

Çalışmaya katılan tüm hastaların ortalama yaşı 15.03±1.58 olup OKB ve yeme bozukluğu grupları arasında anlamlı fark saptanmadı (p=0.472). Yeme bozukluğu grubunda tüm hastalar kadındı. Tüm hastaların 15'inde (%39.5) komorbid psikiyatrik tanı mevcuttu. 6 (%15.8) hastada SAB, 3 (%7.9) hastada YAB, 3 (%7.9) hastada MDB, 2 (%5.3) hastada dikkat eksikliği ve hiperaktivite bozukluğu (DEHB), 1 (%2.6) hastada ise PB saptandı. Gruplar arasında ek tanı varlığı benzerdi (p=0.100). Diğer sosyodemografik ve klinik verilerin OKB ve YB grupları arasında karşılaştırması Tablo 1'de verilmiştir.

Gruplar arasında ölçek puanları karşılaştırıldığında, YB grubunda istatistiksel olarak anlamlı şekilde ORTO-11 skoru düşük, YTT-40 skoru yüksek saptandı (sırasıyla p=0.009, p=0.001). ÇADÖ-Y çocuk ve ebeveyn formları total ve alt ölçek puanları değerlendirildiğinde; sadece OKB grubunda OKB alt ölçek puanları anlamlı olarak yüksekti (sırasıyla; p=0.017, p=0.049). Diğer alt ölçek puanları ve total skorlar iki grup arasında benzerdi (Tablo 1).

Katılımcılar ortoretik eğilimlerine göre ORTO-11 skoru <21 olanlar ortoretik grup, ≥21 olanlar ortoretik eğilimi düşük grup olarak iki gruba ayrıldı. ORTO-11 skoru <21 olan ve daha fazla ortoretik eğilim gösteren grupta YTT-40 skorları diğer gruba göre istatistiksel anlamlı olarak daha yüksekti (p<0.001). Bu iki grup arasında diğer ölçek puanlarının ve diyet/ beslenme eğitimi/ spor gibi verilerin karşılaştırması Tablo 2'de gösterilmiştir.

Çalışmaya katılan tüm hastaların yaş, ORTO-11, YTT-40, ÇADÖ-Y çocuk ve ebeveyn total anksiyete

ve total skorlarının korelasyon analizinde; yaş ile ORTO-11 ölçeği arasında negatif, YTT-40 ölçeği ile pozitif orta derecede bir korelasyon saptandı ve istatistiksel olarak anlamlıydı (sırasıyla; r=-0.351 p=0.031, r=0.425 p=0.008) (Tablo 3).

Ortoreksiya eğilimine etki eden bağımsız prediktörlerin sonuca en fazla katkısı olanı belirlemek için Binary lojistik regresyon analizi uygulandı. Yaş, öğrenim durumu, ek tanı varlığı, YTT-40 skoru, ÇADÖ-Y toplam anksiyete (çocuk), ÇADÖ-Y toplam skor (çocuk), ÇADÖ-Y toplam anksiyete (ebeveyn), ÇADÖ-Y toplam skor (ebeveyn) bağımsız değişken olarak kullanıldı. Ortoreksiya eğilimini öngören model anlamlıydı ($\chi 2(8) = 8.81$, p=0.358) ve varyansın %64.7'sini açıklayabiliyordu (Nagelkerke R2=0.647). Model ortoreksiya eğilimi olanların 58.7'sini, ortoreksiya eğilimi olmayanların 87.5'ini (toplamda %86.8) doğru tahmin etmişti. Ortoreksiya eğilimi için en önemli prediktörün YTT-40 skoru olduğu saptandı (p=0.010) (Tablo 4).

YTT-40 skorunun artmasının, ORTO-11 skorunun azalmasına ve ortorektik eğilimin artmasına anlamlı düzeyde ve negatif yönlü etkisi olduğu hipotezine dayanılarak iki veri lineer regresyon analizi (Enter yöntemiyle) ile incelendi. Model istatistiksel olarak anlamlıydı (F=21.718 p<0.001) ve anlamlı oto-korelasyon sorunları olmadan (Durbin-Watson=1.785) ORTO- 11 skorundaki varyansın %37.6'sını açıklayabildi ($R^{2:}$ 0.376). Lineer regresyon analizinde YTT-40 puanının, ORTO-11 skorunun anlamlı bir yordayıcısı olduğu saptandı. Regresyon katsayılarına göre; YTT-40 skorunda 1 birimlik artışın, ORTO-11 skorunda 0.234 birimlik azalmaya neden olduğu saptandı (Tablo 5).

4. Tartışma ve Sonuç

Literatürde ON'nin psikiyatrik bozukluklar arasındaki yerini ve hangi sınıflandırma içerisine dahil edilmesi gerektiğinin tartışmaları sürmektedir. Bazı araştırmacılar ON'yi ayrı bir bozukluk olarak tanımlasa da çoğu araştırmacı yeme bozuklukları içerisinde bir antite olarak değerlendirmektedir. Az sayıda çalışmacı ise OKB'nin bir alt tipi veya yansıması olduğunu iddia etmektedir (19). Biz bu çalışmada, literatürdeki tartışmalar eşliğinde yeme bozukluğu ve OKB tanısı ile takip edilen adölesanlarda ortoretik eğilimleri inceleyerek, ON'nin hangi grup hastalık ile ilişkisinin daha güçlü olduğunu göstermeyi hedefledik. Çalışmamızda OKB'si olan adölesanlara göre YB'si olan adölesanlarda ortoretik eğilimlerin daha fazla olduğunu saptadık. Bunun yanı sıra ortoretik eğilim için en önemli prediktörün bozulmuş yeme davranışı olduğunu tespit ettik.

Ortoreksiyanın toplum içerisinde yaygınlığı, özellikle kültürel farklılıklara göre değişmektedir. 2004 yılında 404 katılımcıdan oluşan bir kohortta ortoreksiyanın yaygınlığı %6.9 olarak belirlenmiştir (20). 13-30 yaş arası 864 katılımcıyla yapılan başka bir çalışmada ise %27.8 oranında yaygın ON davranışları tespit edilmiştir (19). Ülkemizde Fidan ve arkadaşlarının tıp öğrencileri üzerinde yaptığı başka bir çalışmada ise ORTO-11 kesme puanı 27 olarak kabul edilmiş ve ON prevelansı %43.6 olarak belirlenmiştir (21). Bizim çalışmamız yeme bozukluğu ve OKB hastalık gruplarını içermesine rağmen ortoreksiya prevelansı %36.8 olarak bulunmuştur. Her ne kadar ORTO-11 kesme puanları çalışmalar arasında farklılık gösterse de Fidan ve arkadaşlarının genel populasyondaki ortoreksiya prevelansı çalışmamıza göre oldukça yüksek görünmektedir. Fidan ve arkadaşlarının çalışmasında erkek katılımcıların daha fazla ortoretik eğilim gösterdiği de belirtilmiştir (21). Cinsiyete bağlı farklılıkların ON üzerine etkisi net olmamakla beraber 120 katılımcı üzerinde yapılan bir çalışmada cinsiyetler arası fark izlenmemiştir. Bu çalışmada kadın ve erkeklerin sağlıklı olan besinlerin alınması, hazırlanması ve tüketimiyle ilgili benzer davranışlar sergileyeceği öne sürülmüştür. Ayrıca daha iyi bir fiziksel görünüm ve kilo kontrolü düşüncesinin cinsiyetler arasında farklı olmadığı belirtilmiştir (22). Adölesan ve genç erişkin katılımcılarla gerçekleştirilen başka bir çalışmada ise her iki cinsiyette benzer ortoretik eğilimler izlenmiştir (19). Çalışmamızda ise ORTO-11 puanı 21 altında olan 14 hastanın hepsinin kadın cinsiyette olduğu izlendi. Çalışmamızın diğer çalışmalardan farklı olan bu bulgusunun, örneklemimizi psikiyatri kliniğinde takipli bir hasta grubundan oluşturmuş olmamızla ilişkili olduğunu düşünmekteyiz.

Literatürde ON'nin yaş ile ilişkisini inceleyen çalışmalarda farklı sonuçlar bildirildiği görülmektedir. Donini ve arkadaşlarının yaptığı çalışmada yaş arttıkça ON eğiliminde artış bildirilmiştir (20). Çalışmamızda ise yaş ile ortoreksiya eğilimi arasında pozitif bir ilişki saptanmıştır. Kültürel olarak benzer örnekleme sahip Türkiye'de yapılan bir çalışmada yaş ile ON eğilimi arasında ilişki olmadığı bildirilmiştir. Bu çalışmanın 19-66 yaş arası yetişkinlerde yapıldığı görülmektedir (9). Bizim çalışmamız ise ergenlerde yapılmış olup, geç ergenlik döneminde ON eğiliminin arttığını göstermektedir. Bu yaş aralığında ON ile ilgili çalışmanın literatürde kısıtlı olduğu göz önüne alındığında, bu bulgumuz önemlidir. Riskli

gruplarda geç ergenlik döneminde ON gelişimi açısından yakın takip önerilebilir.

Çalışmamızda, diyet uygulayan, beslenme eğitimi alan ve sosyal medyada beslenme içeriklerini takip eden hastalarda daha yüksek ortoretik eğilim tespit edildi. Bu hastaların büyük kısmının yeme bozukluğu ile takip edilmesinden dolayı bu beklenen bir durumdu. Bu hastalarda asıl düşünce kilo vermeden daha çok sağlıklı beslenme davranışları olsa da literatürde ON ile vücut imajı ve aşırı kilo takıntısı arasında önemli derecede ilişki olduğu gösterilmiştir (23). Bu durum anoreksiya nevroza ve bulimianın gelişimi ve sürdürülmesinde önemli bir rol alan mükemmeliyetçiliğin ON hastalarında da örtüşme gösterdiğini desteklemektedir (24). Barnes ve Caltabiano'nun çalışmasında ON'nin en önemli öngörücüleri; YB geçmişi, görünüm yönelimi ve aşırı kilo takıntısı olarak belirtilmiştir (23). ON'li hastalarda görünüme aşırı odaklanmanın ve kilo alma korkusunun sağlıklı bir diyetle meşguliyetin altında yatan motivasyonlar olduğu düşünülmektedir (25). Tüm bunlar ON ile diğer yeme bozukluklarının güçlü benzerlikler taşıdığını düşündürmektedir. Buna ek olarak fiziksel aktivitedeki artışın da ortoretik eğilimlerin gelişiminde önemli bir faktör olduğunu belirten çalışmalar mevcuttur. Bu hastaların sağlıklarını iyileştirmek için yoğun egzersiz yaptıkları hatta bunu takıntılı bir hale getirdikleri bildirilmektedir (26, 27). Bizim çalışmamızda da ortoretik eğilim gösteren hastaların daha fazla düzenli egzersiz yaptığı izlenmesine rağmen istatistiksel anlamlı fark saptanmadı. Günümüzde sosyal medya araçları, ortoretik eğilimleri artırabilecek belirli beslenme ve yaşam tarzlarını teşvik edebilmektedir. Turner ve arkadaşları yaptıkları bir çalışmada sosyal medya araçlarında sağlıklı beslenmeyle ilgili içerikleri aktif olarak takip eden kişilerin sağlıklı beslenmeye takıntılı olmaya daha yatkın olduğunu belirttiler. Bu çalışmada ON yaygınlığının %49'lara kadar çıktığı gösterildi (28). Bizim çalışmamızda da ortoretik eğilimi yüksek olan hastaların %64.3'ünün sosyal medyada sağlıklı beslenme içeriklerini takip ettiği izlendi ve literatürle uyumluydu.

Çalışmamızda yeme bozukluklarının şiddetini belirleyen YTT-40 testi tüm katılımcıların yeme tutumlarını belirlemede kullanılmıştır. Korelasyon ve lineer regresyon analizinde YTT-40 skorları ile ORTO-11 skorları arasında anlamlı ve negatif bir ilişki saptanmıştır. Literatürde YTT-40 ölçeği kullanılan ve ortoretik eğilimi karşılaştıran çalışmalarda YTT-40 skorunun artmasının ortorektik eğilimde artışın bir yordayıcısı olduğu saptanmıştır (19, 29). Çalışmamızda elde ettiğimiz veriler ve literatürdeki diğer çalışmalar incelendiğinde bozulmuş yeme davranışında şiddetlenmenin ortorektik eğilimde artışa sebep olduğu izlenmektedir. Bu durumda ON'nin tanısal sınıflandırmada yeme bozukluklarıyla ilişkili olduğu hipotezini desteklemektedir.

ON'de gösterilen bazı davranışlar OKB semptomları ile örtüşme gösterebilir. Yemek hazırlama konusunda aşırı düşünme gibi obsesyonlar, yemek hazırlama ritüelleri gibi zorlayıcı davranışlar ve bozulmuş sosyal işlevler OKB ile örtüşen ON davranışları sayılabilir (22). Literatürde, ortoretik bireylerde obsesif kompulsif semptomların bulunabileceği ve bu semptomların ortoretik eğilim üzerinde pozitif etkisi olduğunu belirten çalışmalar mevcuttur (4, 30, 31). Bunun tam tersine OKB tanılı hastalarda ON yaygınlığının genel popülasyonla benzer olduğunu belirten çalışmalar da mevcuttur (32). OKB tanılı ve sağlıklı katılımcıların ortoretik eğilimlerinin değerlendirildiği bir çalışmada; OKB ve ON şiddeti arasında anlamlı bir ilişki bulunmamıştır. Ancak bu çalışmada yeme bozukluklarında da sık izlenen düzen simetrisi obsesyonları olan hastalarda yüksek ortoretik eğilim izlenmiştir (29). Strahler ve arkadaşları yaptıkları bir çalışmada OKB ile ON arasında bir korelasyon saptamıştır ancak bu korelasyon yeme bozukluğu olan gruba göre oldukça düşüktür (33). Çalışmamızda da ortoretik eğilim gösterenler arasında OKB tanısı ile takip edilen hastalar mevcuttur. Ancak bu oran yeme bozukluğu grubuna göre oldukça düşük gözükmektedir (%71.4 ve %28.6). Çalışmamızın verileri, ON ile OKB'nin bazı semptomları arasında örtüşme olabilse de, ON'nin yeme bozuklukları ile daha güçlü ilişkisi olduğunu desteklemektedir.

Bir diğer bakış açısına göre ortoretik eğilimli kişilerin daha sonraki yaşamlarında yeme bozukluğu gelişimi için bir risk altında olduğu düşünülmektedir (4, 34). Yeme bozuklukları ile ON'nin bir semptom örtüşmesi mi yoksa birbirini tetikleyen durumlar mı olduğu henüz açıklığa kavuşturulmamıştır. Yeme bozukluklarının tedavisi sonrası hastaların ortoretik eğilimlerinin arttığına dair bir çalışmada ON semptomlarının varlığının yeme bozukluklarında iyileşme ve daha az şiddetli yeme bozukluğuna geçişin bir göstergesi olduğu iddia edilmiştir (35). Çalışmamız kesitsel yapıda olması ve gözlem çalışması olmaması nedeniyle ortoretik eğilimlerin tedavi süreciyle değişimi değerlendirilememiştir.

Çalışmamızın sonuçlarını bazı kısıtlılıkları ile değerlendirmekte fayda vardır. Bunlardan en önemlisi çalışmamızın tek merkezli ve kesitsel olması, az sayıda hasta ile gerçekleştirilmesidir. Ancak sadece yeme bozukluklarının toplumda

sıklığı ve poliklinik başvurularının azlığı düşünüldüğünde adölesanlar üzerinde gerçekleştirilen bu çalışmada hasta sayısının özellikle yeme bozukluğu grubunda az olması beklenen bir durumdur. Çalışmaya katılan tüm hastalar tedavi altında olduğundan, tedavinin ortoreksik davranışlara etkisi incelenememiştir. ÇADÖ-Y ebeveyn ve çocuk formunun gruplar arasında homojenizasyon gösteriyor olması, kesin tanı almış iki farklı hastalık grubunda ortoretik eğilimlerin karşılaştırılması ve regresyon analizleri çalışmayı güçlendirmiştir. ON'nin daha iyi anlaşılması ve ruhsal bozukluklar arasında net olarak sınıflandırılması için daha fazla hasta sayılı ve çok merkezli çalışmalara ihtiyaç vardır.

Bugüne kadar ON'nin tanımı ve sınıflandırması üzerine yapılan çalışmaların çoğunun genç erişkinler üzerinde ve farklı hastalık gruplarından daha çok genel popülasyonda veya tek hastalık grubunda yeme bozuklukları, OKB semptomları ile ortorektik eğilimlerin ilişkisinin araştırıldığı görülmektedir. Çalışmamızda ON belirtilerinin adölesanlar üzerinde araştırılmış olması ve iki farklı hastalık grubunda ortoretik eğilimlerin karşılaştırılmasının literatür için yeni bir bakış açısı kazandıracağını düşünmekteyiz. Sonuçlarımıza göre ON'nin yeme bozukluklarının içerisinde sınıflandırılması için daha fazla ve güçlü kanıt olduğunu düşünmekteyiz.

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Perkütan Plantar Fasya Gevşetme , Kalkaneal Delik Açma ve Kalkaneal Spur Eksizyonu ile ESWT'nin Plantar Fasiit Tedavisindeki Karşılaştırmalı Sonuçları

Comparative Outcomes of Percutaneous Plantar Fascia Release, Calcaneal Drilling, and Calcaneal Spur Removal versus ESWT in the Treatment of Plantar Fasciitis

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Abstract: This study aimed to compare the clinical outcomes of percutaneous plantar fascia release, calcaneal drilling, and calcaneal spur excision with extracorporeal shock wave therapy (ESWT) in patients with plantar fasciitis resistant to conservative treatment. A total of 52 patients diagnosed with plantar fasciitis and unresponsive to at least six months of conservative therapy between January 2021 and December 2024 were retrospectively analyzed. Patients were divided into two groups: minimally invasive surgery (n = 18) and extracorporeal shock wave therapy (ESWT) (n = 34). Demographic data, symptom duration, standing time at work, return-to-work time, complications, and clinical outcomes were compared using the Visual Analog Scale (VAS), the American Orthopaedic Foot & Ankle Society (AOFAS) score, and the Roles & Maudsley (RM) score. There were no significant differences between the groups in terms of age, gender, body mass index (BMI), symptom duration, or standing time at work ($p > 0.05$). Return-to-work time was significantly longer in the minimally invasive surgery group (13.8 ± 4.5 vs. 4.3 ± 2.8 days, $p = 0.001$). While both groups showed comparable clinical improvement at the 6-month follow-up, VAS and AOFAS scores were better maintained in the surgical group at 12 months. In contrast, a decline was observed in the ESWT group ($p = 0.001$ and $p = 0.012$). Complication rates were similar between the groups ($p = 0.99$). Minimally invasive surgery provided more sustainable long-term clinical improvement. On the other hand, ESWT offered a predictable short-term cost advantage and enabled earlier return to work. Considering patient expectations and ease of application, ESWT appears to be an effective and practical treatment option that should be considered before proceeding with minimally invasive surgical interventions.
Keywords: Plantar fasciitis; Minimally invasive surgery; ESWT

Özet: Bu çalışma, konservatif tedaviye dirençli plantar fasiitli hastalarda, perkütan plantar fasya gevşetmesi, kalkaneal delik açma ve kalkaneal spur eksizyonu ile Ekstrakorporeal Şok Dalga Tedavisi (ESWT)'nin klinik sonuçlarını karşılaştırmayı amaçlamaktadır. Ocak 2021 ile Aralık 2024 tarihleri arasında plantar fasiit tanısı almış ve en az altı ay konservatif tedaviye yanıt vermemiş 52 hasta, retrospektif olarak analiz edilmiştir. Hastalar iki gruba ayrılmıştır: minimal invaziv cerrahi (n=18) ve ESWT (n=34). Demografik veriler, semptom süresi, işte ayakta durma süresi, işe dönüş süresi, komplikasyonlar ve klinik sonuçlar, Görsel Analog Skala (VAS), Amerikan Ortopedik Ayak ve Ayak Bileği Derneği Skoru (AOFAS) ve Roles & Maudsley Skoru (RM) ile karşılaştırılmıştır. Gruplar arasında yaş, cinsiyet, Vücut Kitle İndeksi (BMI), semptom süresi veya işte ayakta durma süresi açısından anlamlı bir fark bulunmamıştır ($p > 0.05$). İşe dönüş süresi, minimal invaziv cerrahi grubunda daha uzun bulunmuştur (13.8 ± 4.5 vs. 4.3 ± 2.8 gün, $p = 0.001$). Altıncı ayda her iki grup da benzer klinik iyileşme göstermiştir; ancak 12. ayda VAS ve AOFAS skorları cerrahi grupta daha iyi kalmış, ESWT grubunda ise gerileme gözlenmiştir ($p = 0.001$ ve $p = 0.012$). Komplikasyon oranları karşılaştırılabilir bulunmuştur ($p = 0.99$). Minimal invaziv cerrahi, uzun vadede daha sürdürülebilir klinik iyileşme sağlamaktadır. Buna karşın, ESWT erken dönemde öngörülebilir bir maliyet avantajı sunmakta ve hastaların daha kısa sürede iş yaşamına dönebilmesine olanak tanımaktadır. Hasta beklentileri ve uygulama kolaylığı gibi faktörler göz önünde bulundurulduğunda, ESWT'nin etkili ve pratik bir tedavi seçeneği olarak minimal invaziv cerrahi yöntemlere geçilmeden önce değerlendirilmesi önerilmektedir.
Anahtar Kelimeler: Plantar fasiit; Minimal invaziv cerrahi; ESWT

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1. Giriş

Plantar fasiit, erişkinlerde topuk ağrısının yaygın bir nedenidir ve genellikle plantar fasyanın kalkaneusun medial tüberkülünde yer alan orijininde meydana gelen kollajen dejenerasyonundan kaynaklanır. Bu dejenerasyon, vücudun doğal iyileşme kapasitesini aşan tekrarlayan mikro yırtıklar sonucu oluşur. Tanı, öncelikle ayrıntılı bir anamnez ve fizik muayeneye dayanan klinik bulgularla konur (1). Kalkaneal spur ise plantar fasyanın kalkaneusun medial kısmına tutunduğu bölgede tekrarlayan gerilim nedeniyle oluşur ve plantar fasiit ile birlikte gözlemlenebilir. Kalkaneal spurun, plantar fasiitli hastalarda ağrıya katkıda bulunduğu düşünülmektedir (2). Plantar fasiitin en belirgin klinik bulgusu, sabahın ilk birkaç adımında veya aktiviteye başlandığında hissedilen yoğun ağrıdır. Bu ağrı, hasta hareket ettikçe giderek azalır; ancak daha şiddetli vakalarda gün sonunda tekrar artabilir (3).

Plantar fasiit tedavisinde çeşitli tedavi modaliteleri mevcut olup, bu geniş tedavi yelpazesi standart bir tedavi algoritması oluşturulmasını zorlaştırmaktadır. Amerikan Ayak ve Ayak Bileği Cerrahları Koleji (ACFAS) tarafından yayımlanan güncel klinik uygulama ve tedavi kılavuzu, yönetimin aşamalı bir tedavi algoritması çerçevesinde ele alınmasını önermektedir (4). Tedavinin birinci aşamasında, oral antiinflamatuar ilaçlar, germe egzersizleri, topuk yastık desteği, lokal kriyoterapi ve kortikosteroid enjeksiyonları uygulanmaktadır. Bu tedavilere altı hafta boyunca yeterli yanıt vermeyen olgularda ikinci aşamaya geçilmektedir. İkinci aşamada, birinci basamak tedavilerin sürdürülmesinin yanı sıra, ek tedavi seçenekleri değerlendirilmelidir. Bu kapsamda, ortotik cihaz kullanımı, plantar fasyanın ve gastroknemius-soleus kompleksinin uyku sırasında uzatılmış pozisyonda kalmasını sağlamak amacıyla gece atellerinin uygulanması, tekrarlayan kortikosteroid enjeksiyonları, fizik tedavi programının başlatılması, yürüme ateli ile immobilizasyon ve ayağın yükten arındırılması gibi yöntemler önerilmektedir.

Hastaların yaklaşık %90'ı, tedaviye ilk iki aşamada, altı ay içinde olumlu yanıt verir (5). Bu tedavilere, altı ay içinde yanıt alınamayan olgularda üçüncü aşamaya geçilmektedir. Bu aşamada, plantar fasyaya cerrahi müdahale uygulanması veya Ekstrakorporeal Şok Dalga Tedavisi (ESWT) gibi ileri düzey tedavi yöntemleri önerilmektedir. ESWT, vücut dışından uygulanan yüksek enerjili ses dalgaları ile doku iyileşmesini teşvik eden, ağrıyı hafifleten ve kas-iskelet sistemi rahatsızlıklarında yaygın olarak kullanılan bir tedavi yöntemidir. ESWT'nin etki mekanizması, kan dolaşımını artırarak dokuların oksijenlenmesini sağlamak, kollajen üretimini uyararak doku yenilenmesini teşvik etmek, inflamatuar yanıtı modüle etmek, ağrı mekanizmalarını baskılamak ve kalsifikasyonların parçalanmasını kolaylaştırmak üzerine kuruludur. Şok dalgaları, hedef dokuda mikrotravmalar oluşturarak fibroblast ve makrofaj aktivitesini artırır; böylece hasarlı dokuların rejenerasyon sürecini hızlandırır (6). Özellikle radial ESWT (rESWT), şok dalgalarının geniş bir alana yayılması prensibine dayanarak daha yüzeyel dokulara etki eder ve tendinopatiler, miyofasiyal ağrı sendromları ve plantar fasiitlerde etkili bir seçenek sunar (7).

Cerrahi yöntemler incelendiğinde, plantar fasya gevşetme, geleneksel ve yaygın olarak uygulanan bir işlemdir. Bu işlem, açık, endoskopik veya perkütan yapılabilmektedir (8). Yeni tanımlanmış minimal invaziv bir cerrahi teknik, perkütan plantar fasya gevşetme işlemini, kalkaneal spurun eksizyonu ve kalkaneusun delinmesiyle birleştirir. Bu yaklaşım, plantar fasiit ile ilişkili hem fasyal gerginliğe hem de kemik büyümesine yönelik bir çözüm sunmaktadır. Spurun eksizyonu ve kemik iyileşmesini teşvik etmeye yönelik delme işlemiyle, hem ağrının azaltılması hem de doku yenilenmesinin desteklenmesi amaçlanmaktadır. Bu işlemlerin büyük bir kesi gerektirmeden uygulanması sayesinde, iyileşme sürecinin hızlandırılması hedeflenmektedir (9, 10).

Bu çalışmada, ilk iki aşamadaki konservatif tedavilere yanıt vermeyen plantar fasiit olgularında ESWT ve yeni minimal invaziv cerrahi yöntemin klinik etkinliğini karşılaştırmak amaçlanmıştır. Tedavi sonrası 6. ve 12. aylardaki klinik sonuçları değerlendirilerek her iki yöntemin uzun vadeli etkinliği ortaya konmuştur. Ayrıca, literatürde sınırlı sayıda çalışmanın bulunduğu yeni minimal invaziv cerrahi yaklaşımının klinik etkinliği incelenerek bu iki tedavi yönteminin tedavi algoritmasındaki yeri daha net bir şekilde belirlenmeye çalışılmıştır.

Hipotezimize göre, ESWT tedavisi; minimal invaziv cerrahi ile karşılaştırılabilir klinik sonuçlar sağlayabilen ve uygulanabilirlik açısından daha avantajlı, minimal invaziv cerrahi girişim öncesinde alternatif bir tedavi basamağı olarak değerlendirilmelidir.

2.Gereç ve Yöntemler

Bu retrospektif karşılaştırmalı çalışma için kurumsal etik kurul onayı Eskişehir Şehir Hastanesi'nden alınmıştır (Karar No: ESH/BAEK 2025/75).

2.1 Hasta Seçimi ve Grupların oluşturulması

Ocak 2021 ve Aralık 2024 arasında, Eskişehir Yunus Emre Devlet Hastanesi Ortopedi ve Travmatoloji ve Fizik Tedavi ve Rehabilitasyon polikliniğine başvuran, plantar fasiit tanısı almış ve 6 ay boyunca ilk iki aşamada uygulanmış tedavi yöntemlerine yanıt alınamamış, ESWT veya Minimal invaziv cerrahi teknik ile tedavi edilmiş hastaların verileri M77.3 (kalkaneal spur) M72.2 (plantar fasciitis) Uluslararası Hastalık Sınıflandırma (ICD) kodu ile hastane veritabanından ve işlemi yapan hekimler tarafından oluşturulan hasta takip formundan retrospektif olarak incelenmiştir. Çalışmada kullanılan tedavi yöntemleri Ocak 2021 ile Aralık 2023 tarihleri arasında uygulanmıştır. Hastaların takibi ve veri toplama süreciyle birlikte çalışma, Ocak 2021 ile Aralık 2024 tarihleri arasında gerçekleştirilmiştir.

Bu çalışmanın dahil edilme kriterleri arasında, 18 yaşından büyük bireyler ile klinik muayene sonucu ağrılı topuk sendromu tanısı almış hastaların yer alması bulunmaktadır. Hastaların sabahları veya uzun süre oturma sonrası ilk yük verme sırasında fasyanın topuğa tutunduğu bölgede lokalize ağrı ve uzun süreli yürüme ya da 15 dakikadan fazla ayakta kalma ile artan ağrı gibi pozitif klinik bulgulara sahip olmaları gerekmektedir. Ayrıca, katılımcıların ilk iki aşamada uygulanan tedavilere 6 ay boyunca yanıt vermemiş olmaları ve sevk öncesinde en az 4 haftalık bir tedavisiz dönem geçirmiş olmaları gerekmektedir. Gruplar arasında homojenlik sağlamak amacıyla, sadece preoperatif radyografilerde kalkaneal spuru olan hastalar çalışmaya dahil edildi. Yapılacak işlemler öncesinde, klinik rutinimizde işlemlerin olası riskleri için hastalardan bilgilendirilmiş onam formu alındı.

Bu çalışmada, ayak veya ayak bileği işlev bozukluğu (örneğin, instabilite), ayak artrozu veya artriti, alt ekstremitede enfeksiyonlar ya da tümörler, nörolojik anormallikler ve sinir sıkışması (örneğin, tarsal tünel sendromu) bulunan hastalar hariç tutulmuştur. Ek olarak, damar anomalileri (şiddetli varis, kronik iskemik durumlar), kanama bozuklukları ve antikoagülan tedavi kullanımı da dışlama kriterleri arasında yer almaktadır. Hamilelik ve diyabet varlığı çalışma kapsamı dışında bırakılmış olup, daha önce ESWT, cerrahi tedavi, trombositten zengin plazma (PRP) uygulaması veya radyofrekans ablasyon tedavisi uygulanmış bireyler de çalışmaya dahil edilmemiştir.

Dahil edilme ve hariç tutma kriterleri göz önünde bulundurulduğunda, toplam 52 hastanın çalışma için uygun olduğu görülmüştür. Bu hastalardan 18'i yeni minimal invaziv cerrahi yöntemle tedavi edilmiştir; bu işlem kısmi plantar fasyotomi, kalkaneusun delinmesi ve kalkaneal spurun çıkarılmasını içermekteydi. 34 hasta ise ESWT tedavisi almıştır. Müdahaleden önce, hastalar ortalama 12,9 ay süreyle (7-22 ay) semptomlar yaşamıştır. Her hasta, topuktaki ağrı bölgelerini belirlemek ve enfeksiyon ya da tümör gibi diğer topuk ağrısı nedenlerini dışlamak amacıyla kapsamlı bir klinik ayak muayenesinden geçirilmiştir. Radyolojik değerlendirmeler, enfeksiyonları, stres kırıklarını, tümörleri ve orta tarsal eklemlerin dejeneratif durumlarını dışlamak amacıyla direkt röntgen görüntülemesini içermekteydi.

2.2 Grupların Değerlendirilmesi

Gruplar; yaş, cinsiyet, vücut kitle indeksi, semptom süresi (ay), işte ayakta kalma süresi (0–3 saat, 3–6 saat, 6–12 saat, ≥12 saat; emekli hastalar 0–3 saat grubuna dahil edildi) ve tedavi sonrası aktif işe dönüş süresi (gün) açısından karşılaştırılmıştır. Özellikle iş yerinde günde 3 saat veya daha az ayakta kalan bazı hastalar, ESWT işlemi sonrası aynı gün işlerine dönebildi; bu hastalar işe dönüş süresi olarak "0. gün" şeklinde kaydedilmiştir.

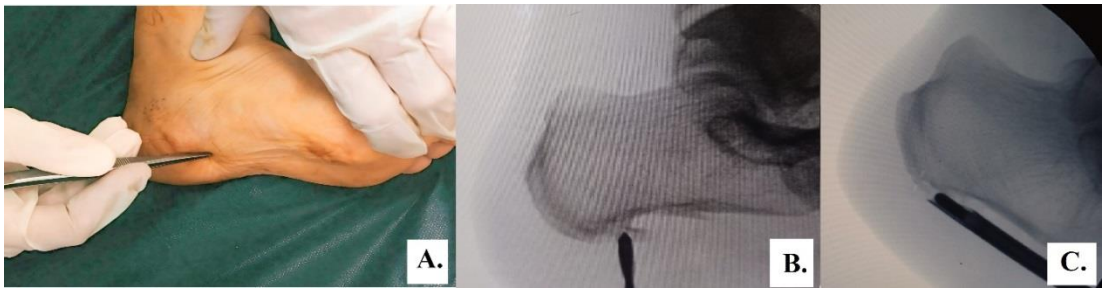
Klinik değerlendirme açısından, hastaların ameliyat öncesi ve sonrasındaki takiplerinde fonksiyonel ve ağrı düzeylerini belirlemek amacıyla VAS (Visual Analog Scale - Görsel Analog Skala), AOFAS (American Orthopaedic Foot & Ankle Society Score) ve Roles & Maudsley (RM) skorları kaydedilmiştir. VAS, ağrı düzeyini subjektif olarak değerlendirmek için kullanılan bir ölçek olup, 0 (hiç ağrı yok) ile 10 (dayanılmaz ağrı) arasında bir skala üzerinde hastanın hissettiği ağrıyı ifade etmesini sağlar. AOFAS, ayak ve ayak bileği fonksiyonlarını değerlendiren bir klinik skorlama sistemi olup, ağrı, fonksiyonel kısıtlılık, yürüme mesafesi, destek ihtiyacı, hareket açıklığı, stabilite ve anatomik uyum gibi parametreleri içerir. Maksimum 100 puan üzerinden değerlendirilen bu ölçekte yüksek skorlar, daha iyi fonksiyonel sonuçları ifade etmektedir. Roles & Maudsley skoru ise hasta memnuniyeti ve fonksiyonel iyileşmeyi değerlendirmek için kullanılan dört dereceli bir skala olup, mükemmel (tam fonksiyonel iyileşme ve ağrısızlık), iyi (hafif ağrı ve minimal kısıtlılık), orta (belirgin ağrı ve kısıtlılık) ve kötü (ciddi ağrı ve belirgin disfonksiyon) olarak sınıflandırılmaktadır.

Bu skorlamalar, klinik değerlendirmelerde yaygın olarak kullanılan ve geçerliliği ile güvenilirliği kabul edilmiş objektif ölçüm yöntemleridir (11, 12). Bu skorlar tedavi öncesinde ve tedavi sonrası 6.ay ve 12.ayda kaydedilmiştir.

2.3 Cerrahi Teknik

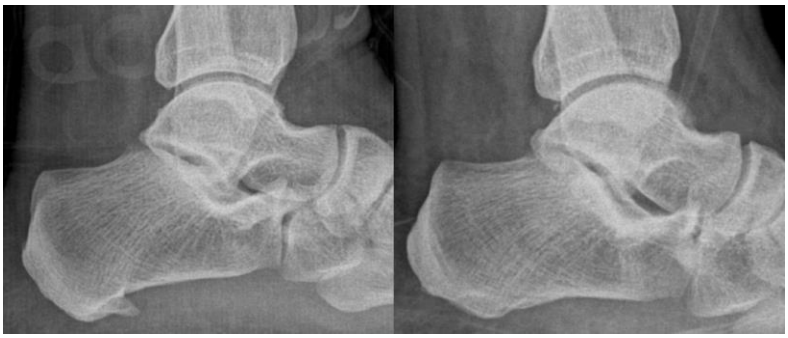
İşlem, aseptik cerrahi koşullar altında spinal anestezi uygulanarak gerçekleştirildi. Müdahale edilecek alt ekstremite steril bir örtü ile izole edilerek cerrahi alanda kontaminasyon riski en aza indirilmiştir. C-kollu skopi cihazı kullanılarak görüntüleme sağlandı ve kalkaneal spurun ucu anteroposterior ve lateral pozisyonlarda tespit edilmiştir. Kılavuz olarak kullanılan Kirschner telleri, izdüşüm doğrultusunda hizalanarak kesişim noktası belirlendi. Daha sonra, cerrahi klemp ile işaretlenerek insizyonun yapılacağı anatomik bölge netleştirildi. Belirlenen insizyon noktasından, yaklaşık 1 cm'lik yatay bir medial insizyon yapılarak cilt ve cilt altı doku dikkatlice açıldı. Bu aşamada cerrahi klemp yardımıyla kontrollü bir şekilde ilerlenerek derin dokulara ulaşıldı. Plantar fasyanın belirgin hale getirilmesi amacıyla, ayak ve parmaklar dorsifleksiyon pozisyonuna getirilerek plantar fasyada maksimum gerilim oluşturuldu. Palpasyonla plantar fasyanın lokalizasyonu kesin olarak belirlendikten sonra, topuk yağ yastığı dikkatlice diseke edilerek fasyanın yüzeysel bölgesi açığa çıkarıldı. Bir bistüri kullanılarak plantar fasyada yüzeysel insizyon yapıldı. Yapısal bütünlüğü korumak amacıyla, plantar fasyanın yaklaşık %50'lik kısmı insize edilirken, kalan yarısı korunarak fasya bandının tam serbestleşmesi önlenmiştir. Diseksiyon işlemi, plantar fasyanın tamamen serbestleştirilmesini engellemek amacıyla kontrollü bir şekilde derin kas seviyesine kadar devam ettirildi.

Kısmi plantar fasyotomi tamamlandıktan sonra, aynı medial insizyon noktasından kalkaneal spurun etrafında sıralı kalkaneus delme işlemi gerçekleştirilmiştir. Bu işlem için 2.5 mm çapında bir matkap ucu kullanılarak C-kol skopi rehberliğinde çoklu matkap delikleri açılmıştır. Sonrasında, aynı insizyon hattı içerisinden 4 mm uç çapına sahip bir cerrahi burr 3000 bmp (devir/dakika) hızında çalıştırılarak skopi rehberliğinde kalkaneal spur eksizyonu yapılmıştır. Spur, proksimal ucundan distal tabanına kadar dikkatle eksize edilmiştir. Termal nekrozu önlemek için bu işlem uygulanırken, motor çalıştığı sürece işlem yapılan bölgeye serum fizyolojikle yıkanmıştır. Cerrahi işlemin tamamlanmasının ardından, açılan 1 cm'lik insizyon hattı uygun doku adaptasyonu sağlanarak tek bir sütür ile primer olarak kapatılarak, steril bir pansuman uygulanmıştır.



Resim 1: Minimal invaziv yöntemin uygulanması A; yer belirlenmesi, B; görüntüleme cihazı altında delme işlemi (2,5 mm matkap ucu) C; görüntüleme cihazı altında burr leme işlemi (4 mm cerrahi burr uç).

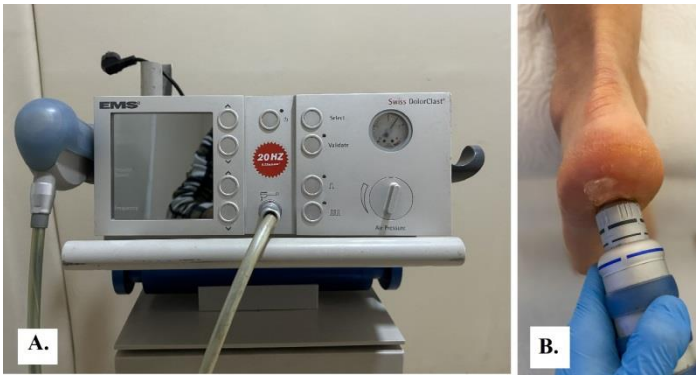
Hastalar, ameliyat günü yalnızca elastik bandaj ile taburcu edilmiştir. Her hastaya, ameliyat sonrası ilk iki hafta boyunca kısmi yük vermeleri ve ardından dört hafta süreyle silikon topuk desteği kullanarak tam yükle yürümeye başlamaları talimatı verilmiştir. Dikişler, postoperatif 10. günde alınmış; bu süreçte yüzeyel dikiş hattında irritasyon gelişmesini önlemek amacıyla elastik bandaj kullanımına devam edilmesi önerilmiştir. Takip değerlendirmeleri, ağrı düzeyleri, aktivite seviyeleri ve genel hasta memnuniyetine odaklanarak klinik sonuçları değerlendirmek amacıyla gerçekleştirilmiştir.



Resim 2 : Kalkaneal spur eksizyonu preoperatif ve postoperatif 1.yıl X-RAY görüntüleri.

2.4 ESWT Tekniği

Bu gruptaki hastalara, rESWT uygulaması fizik tedavi ünitesinde, eğitimli fizyoterapistler eşliğinde gerçekleştirilmiştir. Hastalara rESWT tedavisi, Swiss Dolorclast Master® ESWT cihazı (EMS SA, CH1260, Nyon, Switzerland) ile, haftada 3 kez olmak üzere toplam 5 seans şeklinde uygulanmıştır. Hastalara yüzüstü pozisyon verilmiştir. İletici ajan olarak ultrason jeli, kalkaneusun medialinde tespit edilen en hassas noktaya uygulandıktan sonra, lokal anestezi kullanılmaksızın, 15 mm'lik standart bir aplikatör yardımıyla küçük dairesel hareketlerle şok dalgaları uygulanmıştır. Her seansta 10 Hz frekans, 2.5 bar basınç ve 2500 atım parametreleri kullanılmıştır. Hastalara herhangi bir ağrı kesici ilaç verilmemiş; ancak, gerektiğinde rESWT'den 20 dakika sonra soğuk uygulama yapılmıştır. Tedavi sonrasında tüm hastalara yük verme izni verilmiş, ancak ilk iki hafta boyunca spor aktivitelerinden veya aşırı yürüyüşten kaçınmaları önerilmiştir.



Resim 3: rESWT işlemi.

2.5 İstatistiksel Yöntem

Tüm istatistiksel analizler, IBM SPSS Statistics 25 yazılımı kullanılarak gerçekleştirilmiştir. Veri setinin dağılım özelliklerini belirlemek amacıyla Kolmogorov-Smirnov testi uygulanmış ve verilerin normal dağılım gösterdiği tespit edilmiştir. Hastaların preoperatif verileri ile postoperatif 6. ay ve 1. yıl sonuçlarının karşılaştırılmasında, bağımlı değişkenler için bağımlı örneklem t-testi (paired samples t-test) kullanılmıştır. Gruplar arasındaki karşılaştırmalarda, bağımsız değişkenlerin iki grup arasında farklılık gösterip göstermediğini belirlemek amacıyla bağımsız örneklem t-testi (independent samples t-test) uygulanmıştır. Nominal verilerin karşılaştırılmasında ise 2 verili tablolar için Ki-kare testi (χ^2 testi) ve 3 ve daha fazla verili tablolar için Ki-kare Monte Carlo testi kullanılmıştır. Tüm analizlerde $p < 0.05$ istatistiksel olarak anlamlı kabul edilmiştir. Çalışmamızda, Cohen's d değerleri hesaplanmış olup, istatistiksel olarak anlamlılık ifade eden değişkenlerde yüksek etki büyüklüğü saptanmıştır. Ayrıca, G*Power yazılımı ile yapılan analiz sonucunda, yüksek etki büyüklüğüne sahip değişkenler için, 52 hastadan oluşan örneklem grubunun %90 istatistiksel güç sağladığı belirlenmiştir.

3. Bulgular

Tablo 1'den de anlaşılacağı üzere; gruplar arasında yaş, vücut kitle indeksi, işlem öncesi semptom süresi, cinsiyet dağılımı, işlerinde ayakta durma

sürelerine göre dağılım açısından anlamlı derecede fark yoktu. İşe dönüş zamanı açısından bakıldığında, minimal invaziv grupta (17 çalışan hasta 13,8 ± 4,5 gün), ESWT grubuna (32 çalışan hasta 4,3 ± 2,8 gün) kıyasla anlamlı derecede daha uzun sürede işe dönüş gözlemlendi (p=0,001).

Minimal invaziv grupta 1 adet selülit görülürken; ESWT grubunda 1 adet işlem sonrası kızarıklık izlendi, iki grupta da kayda değer başka bir komplikasyon görülmedi.

Tablo 1: Gruplar arasındaki demografik özelliklerin karşılaştırması.

Toplam=52 Kadın/Erkek=19/12	**Minimal invaziv cerrahi n=18**	**ESWT n=34**	**P değeri**
Yaş (yıl)	48.1 ± 6.9	55.6 ± 7.8	0.284
Cinsiyet (Kadın/Erkek)	6/12 (33.3/66.6)	14/20 (38.5/61.5)	0.403*
Vücut Kitle İndeksi	28.1 ± 2.6	27.4 ± 2.9	0.887
Semptom Süresi (ay)	12.6 ± 3.7	13.3 ± 3.5	0.647
İşte ayakta kalma süresi			
0-3 saat	2 %11.1	5 %14.7	0.888**
3-6 saat	4 %22.2	10 %29.4	
6-12 saat	9 %50	15 %44.1	
>12 saat	3 %16.7	4 %11.8	
İşe dönüş zamanı (gün)	13.8 ± 4.5 (n:17)	4.3 ± 2.8 (n:32)	**0.001**
Komplikasyon	1 selülit	1 işlem sonrası kızarıklık	0.999

*ESWT: ekstrakorporal şok dalga terapisi n: hasta sayısı % hasta yüzdesi p<0,05 istatistiksel anlamlılık değeri, bağımsız örneklem t testi, ki kare testi * ve ki kare monte caro testi** uygulandı, sayısal değişkenler ortalama ± standart sapma şeklinde verilmiştir, kategorik değişkenler sayı ve yüzde şeklinde verilmiştir.*

Tablo 2: Gruplar arasında klinik özelliklerin karşılaştırılması.

	Minimal invaziv cerrahi n=18	**ESWT N=34**	**P değeri**
VAS işlem öncesi	7.8 ± 1	8.1 ± 0.9	0.090
VAS 6. ay	1.7 ± 0.66	1.9 ± 0.77	0.267
VAS 12. ay	1.8 ± 0.78	2.7 ± 0.93	**0.001**
AOFAS işlem öncesi	42.5 ± 7.8	43.5 ± 7.7	0.636
AOFAS 6. ay	78.4 ± 9.5	79.1 ± 7.2	0.727
AOFAS 12. ay	79.3 ± 7.2	73.4 ± 6.7	**0.012**

VAS: Görsel Analog Skalası; AOFAS: Amerikan Ortopedik Ayak ve Ayak Bileği Derneği Skoru ESWT: Ekstrakorporal Şok Dalga Terapisi n: hasta sayısı % hasta yüzdesi p<0,05 istatistiksel anlamlılık değeri, bağımsız örneklem t testi uygulandı, sayısal değişkenler ortalama ± standart sapma şeklinde verilmiştir.

Tablo 3. Gruplar arasında klinik iyilik haline göre dağılımın karşılaştırılması.

	RM sonucu	**Minimal invaziv cerrahi n=18**	**ESWT n=34**	**P değeri**
RM işlem öncesi	Mükemmel	0/0	0/0	0.390
	İyi	0/0	0/0	
	Orta	2 /11	7 /20.6	
	Kötü	16/88.9	27/79.4	
RM 6. Ay	Mükemmel	10/ 55.6	17 %50	0.894
	İyi	7 / 38.9	15 %44.1	
	Orta	1/ 5.6	2 %5.9	
	Kötü	0/0	0/0	
RM 12. Ay	Mükemmel	9 /50	9 /26.5	**0.017**
	İyi	8/44.4	13/ 38	
	Orta	1/5.6	10 /29.4	
	Kötü	0/0	2 /5.9	

RM: Roles ve Maudsley skoru , ESWT:vekstrakorporal şok dalga terapisi n: hasta sayısı % hasta yüzdesi p<0,05 istatistiksel anlamlılık değeri, ki kare monte caro testi uygulandı. , kategorik değişkenler sayı/yüzde şeklinde verilmiştir.

Tablo 2 ve Tablo 3'te belirtildiği üzere; minimal invaziv cerrahi tedavi grubu için AOFAS skorları şu şekildeydi: preoperatif 42,5 ± 7,8; 6. ayda 78,4 ± 9,5; 1. yılda 79,3 ± 9,2. Preoperatif dönem ile hem 6. ay hem 1. yıl AOFAS skorları arasında anlamlı düzeyde fark saptandı (p < 0.05); postoperatif 6. ay ve 1. yıl AOFAS skorları arasında anlamlı fark saptanmadı. (p=0,495).

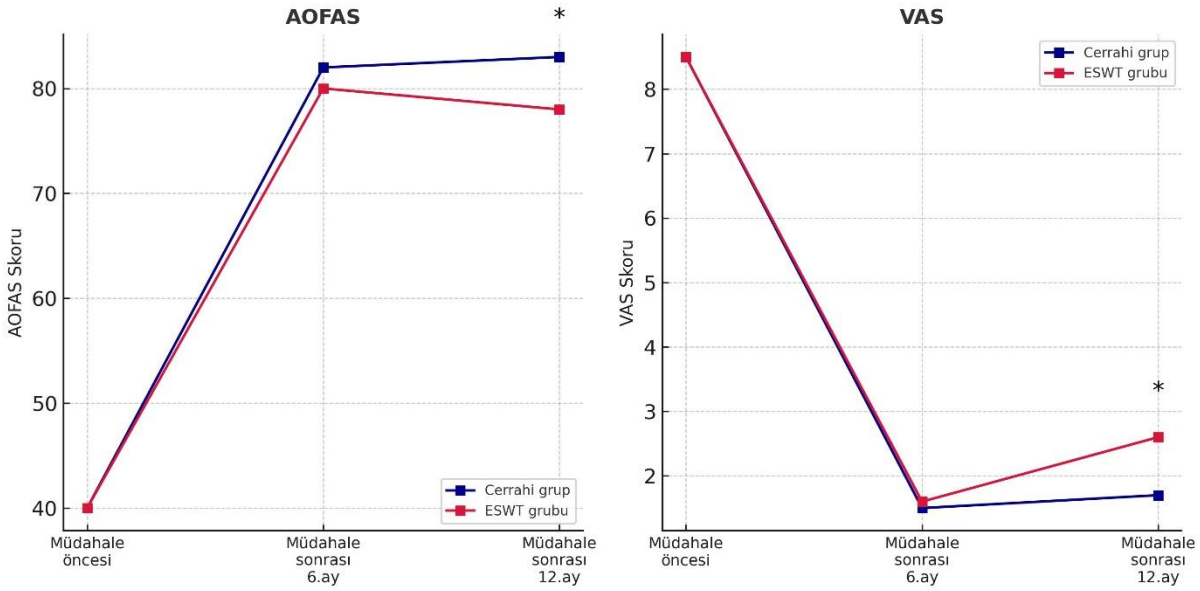
ESWT tedavi grubunda ise AOFAS skorları şu şekildeydi: preoperatif 43,5 ± 7,7; 6. ayda 79,1 ± 7,2; 1. yılda 73,4 ± 6,7. Preoperatif dönem ile hem 6.ay hem 1.yıl AOFAS skorları arasında anlamlı

düzeyde fark saptandı ($p < 0.05$); ayrıca, postoperatif 6. ay ve 1. yıl AOFAS skorları arasında anlamlı fark saptandı ($p < 0.05$).

RM skorlama verilerine göre, 12. ay sonunda minimal invaziv cerrahi tedavi grubunda 9 hastada "mükemmel", 8 hastada "iyi", 1 hastada "orta" sonuç alınmışken; ESWT grubunda 9 hastada "mükemmel", 13 hastada "iyi", 10 hastada "orta" ve 2 hastada "kötü" sonuç alınmıştır.

Minimal invaziv cerrahi tedavi grubu için VAS skorları şu şekildeydi: preoperatif 7,8 ± 1; 6. ayda 31,2 ± 4,9; 1. yılda 30 ± 4,1. Preoperatif dönem ile hem 6. ay hem 1. yıl VAS skorları arasında anlamlı düzeyde fark saptandı ($p < 0,05$); postoperatif 6. ay ve 1. yıl VAS skorları arasında anlamlı fark saptanmadı ($p = 0,507$).

ESWT tedavi grubu için VAS skorları şu şekildeydi: preoperatif 65,6 ± 1,1; 3. ayda 44,3 ± 8,9; 6. ayda 1,9 ± 0,77; 1. yılda 2,7 ± 0,93. Preoperatif dönem ile hem 6. ay hem 1. yıl VAS skorları arasında anlamlı düzeyde fark saptandı ($p < 0,05$); ayrıca, postoperatif 6. ay ve 1. yıl VAS skorları arasında da anlamlı fark saptandı ($p < 0,05$).



Resim 4. Minimal invaziv cerrahi grubunda ve ESWT grubunda işlem öncesi ; işlem sonrası 6.ay ve 12.ay klinik skorların çizgi grafiği.

4. Tartışma ve Sonuç

Plantar fasiit, sıklıkla kalkaneal spur ile ilişkilendirilmekle birlikte, bu yapısal değişiklik her zaman klinik semptomlarla örtüşmemektedir. Asemptomatik bireylerde de kalkaneal spur görülebilirken, plantar fasiit tanısı alan bazı hastalarda spur bulunmayabilir. Bu durum, spur varlığının plantar fasiit patogenezindeki rolünün net olarak belirlenemediğini ve semptomlarla olan ilişkisinin hâlen tartışmalı olduğunu göstermektedir (13). Çalışmamızda, her iki gruptaki hastaların tamamında kalkaneal spur bulunması, bu faktörün karıştırıcı etkisini ortadan kaldırmıştır.

İleri yaş, yüksek vücut kitle indeksi ve uzun süre ayakta kalmanın, plantar fasiit gelişimi ve semptom şiddeti açısından önemli risk faktörleri olduğu daha önceki çalışmalarda bildirilmiştir (14, 15). Çalışmamızda, yaş ve vücut kitle indeksi açısından gruplar arasında anlamlı bir fark saptanmamıştır. Ayrıca, hastalar günlük ayakta kalma sürelerine göre sınıflandırılmış olup (16), bu sınıflandırma doğrultusunda oluşan dağılımda da gruplar arasında anlamlı bir farklılık gözlenmemiştir.

Güncel ACFAS rehberine göre, plantar fasiit tedavisinde basamaklı bir algoritma önerilmektedir ve ilk iki basamak tedavi yöntemlerinden yanıt alınamayan hastalar için cerrahi girişimler veya ESWT önerilmektedir. Literatürde ESWT'nin etkinliğini ve güvenilirliğini destekleyen birçok çalışma bulunmaktadır. Theodore ve arkadaşları, ESWT'nin güvenilir ve başarılı klinik sonuçlar

sağlayan bir tedavi seçeneği olduğunu bildirmiştir (17). Çınar ve arkadaşları, ESWT sonrası AOFAS skorunda anlamlı bir artış gözlemlemişlerdir (18). Benzer şekilde, Kapusta ve Domzalski'nin çalışmaları da AOFAS skorlarının arttığını ve VAS skorlarının azaldığını göstermiştir (19). Daha geniş bir hasta popülasyonunda gerçekleştirilen Kudo ve arkadaşlarının araştırması da bu sonuçları desteklemektedir (20). Çalışmamızda da, ESWT uygulanan hastalarda AOFAS, VAS ve RM skorlarında anlamlı bir iyileşme gözlenmiş, literatürde bildirilen başarılı sonuçlarla uyumlu bulgular elde edilmiştir.

Bununla birlikte, ESWT sonrası bazı hastalarda tedavi sırasında ve sonrasında ciltte kızarma, şişlik, ekimoz, peteşi ve morarma gibi komplikasyonlar bildirilmiştir. Ayrıca, nadir de olsa şiddetli baş ağrısı ve zonklama hissi gibi semptomlar rapor edilmiştir (21). Çalışmamızda, bir hastada ESWT sonrası ciltte kızarıklık gelişmiş ve 2 gün içinde kendiliğinden düzelmiştir.

ESWT uygulama parametreleri arasında seans sayısı, frekans, atım sayısı ve uygulanan basınç gibi değişkenler açısından farklı protokoller bulunmaktadır. Roerdink ve arkadaşlarının kapsamlı meta-analizinde, 39 çalışmadan elde edilen veriler incelenmiş ve ESWT protokollerinin belirgin farklılıklar gösterdiği saptanırken, yöntemlerin birbirine net bir üstünlüğü öne sürülmemiştir. Bu durum, standardize bir uygulama protokolü oluşturmayı zorlaştırmaktadır (21). Sert ve Yılmaz, klinik olarak başarılı sonuçlar elde ettikleri çalışmalarında, haftada üç seans olmak üzere toplam beş seans, her seansta 2,5 bar basınç, 10 Hz frekans ve toplam 2500 atım olacak şekilde ESWT protokolü uygulamışlardır. Klinik rutinimizde de, etkinliği kanıtlanmış bu parametreler doğrultusunda ESWT uygulanmaktadır (22).

Kronik plantar fasiit tedavisinde çeşitli cerrahi yöntemler tanımlanmış olup, bunlar arasında açık cerrahi, endoskopik uygulamalar ve perkütan fasyotomi yer almaktadır ve bu yöntemlerle başarılı sonuçlar elde edilmiştir (23). Açık cerrahi girişimlerde, genellikle plantar fasyanın serbestleştirilmesi veya çıkarılması ve kalkaneal spurun eksizyonu uygulanmaktadır. Ancak, bu yöntem; uzun süren iyileşme süreci, kalıcı ağrı, enfeksiyon riski, sinir hasarı ve hassas cilt izleri gibi sık görülen komplikasyonlarla ilişkilidir (24). Endoskopik plantar fasya gevşetmesi (EPL), plantar fasyanın serbestleştirilmesinde yaygın olarak kullanılmakta ve genellikle yüksek başarı oranları bildirmektedir. Bununla birlikte, ameliyat sonrası portallerde ağrı ve sinir sıkışması gibi istenmeyen durumlar görülebilmektedir (25-27).

Perkütan parsiyel plantar fasyotomi, açık cerrahiye kıyasla daha az postoperatif ağrı, kısa iyileşme süresi, düşük enfeksiyon riski, minimal skar oluşumu, hastanede yatış gereksiniminin azalması ve günlük aktivitelere daha hızlı dönüş gibi avantajlar sunarak, plantar fasiit tedavisinde etkili bir alternatif olarak öne çıkmaktadır (28). Encinas ve arkadaşlarının çalışması, perkütan plantar fasyotominin güvenilir bir yöntem olduğunu ve yüksek hasta memnuniyeti sağladığını göstermektedir (29). Hasegawa ve arkadaşlarının meta-analizi de, perkütan minimal invaziv tekniklerin başarılı klinik sonuçlar sunduğunu ortaya koymuştur (30).

Perkütan parsiyel plantar fasiyotomiye ek olarak, kalkaneal delmenin lokal iyileşme süreçlerini tetiklediği ve dolayısıyla klinik sonuçlar üzerinde olumlu etkiler sağladığı düşünülmektedir. Shawkat ve çalışma arkadaşları, perkütan plantar fasyanın gevşetilmesi ve kalkaneal delme uyguladıkları çalışmalarında, hastalarda klinik olarak tatmin edici sonuçlar elde etmiş ve müdahaleye bağlı herhangi bir komplikasyon gelişmediğini bildirmiştir (31). Kalkaneal spur eksizyonu açısından bakıldığında ise, literatürde kalkaneal spurun ağrıya neden olup olmadığı ve spur eksizyonunun klinik sonuçlara etkisi konusunda farklı görüşler mevcuttur. Bununla birlikte, açık veya endoskopik cerrahi tekniklerle spur eksizyonu yapılan hastalarda başarılı sonuçlar bildiren çalışmalar bulunmaktadır (32-34).

Yeni minimal invaziv teknik, geleneksel açık plantar fasya gevşetme cerrahisi ve endoskopik yöntemlerle gerçekleştirilen kalkaneal spur eksizyonuna kıyasla; minimal bir insizyon aracılığıyla burr uç kullanılarak uygulanmasını ve kalkaneal delme işlemini içermektedir. Bu yaklaşım, iyileşme sürecini hızlandırmakta ve komplikasyon riskini belirgin şekilde azaltmaktadır. Maaty ve arkadaşlarının yaptığı çalışmada, perkütan plantar fasyotomi, kalkaneal delme ve burr uç ile spur eksizyonu yönteminin hem güvenli hem de etkili bir tedavi seçeneği olduğu gösterilmiştir. Kronik plantar fasiit tedavisinde, minimal doku hasarı, hızlı iyileşme süreci ve düşük komplikasyon oranı gibi avantajları nedeniyle bu teknik, alternatif bir tedavi yöntemi olarak değerlendirilmektedir (9). Çalışmamızda da, cerrahi gruptaki hastalara benzer teknik uygulanmış olup, komplikasyon olarak bir hastada cerrahi işlem sonrası lokal kızarıklık gelişmiş ve selülit tanısı konulmuştur. Ancak, uygulanan antibiyotik tedavisi sonrası, hasta bir hafta içinde tamamen iyileşmiştir.

Literatürde, ESWT'nin hem diğer konservatif tedavi modaliteleriyle hem de cerrahi yöntemlerle karşılaştırmalı sonuçlarını ele alan çok sayıda çalışma bulunmaktadır (35-39). Bu araştırmalar, ESWT'nin etkinliğini değerlendirmenin yanı sıra; farklı tedavi yaklaşımlarına kıyasla klinik sonuçlarını, iyileşme sürelerini ve komplikasyon oranlarını karşılaştırarak plantar fasiit yönetimindeki yerini belirlemeye yönelik önemli veriler sunmaktadır. Ancak mevcut literatür incelendiğinde, minimal invaziv cerrahi teknikler ile ESWT'nin klinik sonuçlar ve maliyet değerlendirmesi açısından karşılaştırıldığı bir çalışmaya rastlanmamıştır. Bu durum, konuya ilişkin literatürde önemli bir eksikliğe işaret etmekte olup, çalışmamızın bu alandaki bilgi boşluğunu gidermeye yönelik katkısını ortaya koymaktadır.

Çalışmamızda, ESWT ve yeni minimal invaziv teknik, hastaların VAS, AOFAS ve RM skorları açısından karşılaştırılmıştır. Altıncı ay değerlendirmesinde, her iki yöntemin de benzer düzeyde klinik iyileşme sağladığı gözlenmiştir. Ancak, birinci yıl sonuçlarında, minimal invaziv teknik uygulanan grupta iyileşme devam ederken, ESWT grubunda belirgin bir gerileme olduğu tespit edilmiştir. Buna rağmen, ESWT uygulanan hastaların klinik durumları, müdahale öncesine kıyasla hâlâ anlamlı derecede daha iyi bulunmuştur.

Sosyal Güvenlik Kurumu'nun işlem ücretleri temel alındığında ESWT, hastane yatışı gerektirmemesi ve ameliyathane koşullarında gerçekleştirilen invaziv işlemleri içermemesi nedeniyle, kısa vadede minimal invaziv cerrahi yöntemlere kıyasla daha ekonomik bir tedavi seçeneği olarak değerlendirilmektedir (40). Ancak ESWT uygulanan hastalarda birinci yıl sonunda gözlenen klinik gerileme, bazı hastaların ilerleyen dönemlerde yeniden tedavi arayışına girmesine neden olabilmektedir. Bu durum, zaman içerisinde ortaya çıkabilecek ek tedavi gereksinimlerinin, ESWT'nin ilk etapta sunduğu maliyet avantajını ortadan kaldırabileceğini göstermektedir. Bu nedenle, tedavi yöntemleri arasında daha uzun vadeli maliyet etkinlik analizlerinin yapılması önem taşımaktadır.

Bulgularımız, konservatif tedavilere dirençli ve kalkaneal spuru bulunan plantar fasiit hastalarında ESWT ile minimal invaziv cerrahinin farklı avantajlar sunduğunu göstermektedir. ESWT, non-invaziv olması, poliklinik şartlarında uygulanabilmesi, erken işe dönüş imkânı sunması ve erken dönemde öngörülebilir maliyet etkinliği ile öne çıkmaktadır. Ancak, birinci yılda klinik skorlarda gerileme görülmesi, uzun vadede avantajları konusunda soru işaretleri doğurmaktadır. Öte yandan, minimal invaziv cerrahi yöntemi, uzun süreli klinik iyileşme sağlamasıyla avantaj sunarken; ameliyathane gereksinimi, anestezi ihtiyacı, radyasyon maruziyeti ve maliyet yükü gibi dezavantajlar içermektedir.

Çalışmamızın önemli kısıtlılıklarından biri, örneklem büyüklüğünün nispeten düşük olmasıdır. Polikliniklere plantar fasiit nedeniyle başvuran hasta sayısı yüksek olsa da, tedaviye dirençli kalan ve ileri basamak tedavilere yönlendirilen hasta popülasyonu yaklaşık %10 ile sınırlıdır. Bunun yanı sıra, ESWT'nin seanslar halinde uygulanması ve minimal invaziv cerrahinin ameliyathane ortamında gerçekleştirilmesi, tedavi kabul oranlarını düşüren faktörler arasında yer almıştır. Gelecekte, daha geniş örneklem grupları ile gerçekleştirilecek çalışmalar, bu tedavi yöntemlerinin daha büyük bir hasta popülasyonundaki etkinliğini değerlendirmek ve daha kapsamlı sonuçlara ulaşmak açısından değerli olacaktır.

Çalışmada yer alan hekimler, hastalara üçüncü basamak tedavi seçeneği olarak hem ESWT hem de minimal invaziv cerrahi hakkında standart bilgilendirme yapmış olsa da, hastaların tedavi seçimleri ilk başvurdukları polikliniğe devam etme eğilimleri doğrultusunda şekillenmiştir. İlk değerlendirmesini Fizik Tedavi polikliniğinde yaptıran hastaların büyük oranda ESWT tedavisine devam ettiği, Ortopedi polikliniğine başvuran hastaların ise çoğunlukla minimal invaziv cerrahi tedavi aldığı tespit edilmiştir. Bu durum, hastaların alıştıkları klinik ortamda tedavi sürecini sürdürme isteğiyle ilişkili olabilir. Dolayısıyla, tedavi tercihleri yalnızca klinik algoritmaya bağlı kalmayıp, aynı zamanda hastaların poliklinik seçimleri ve bu doğrultudaki yönelimleriyle de şekillenmektedir. Gelecekteki çalışmalarda, disiplinler arası ortak bir klinik algoritma oluşturularak hasta yönlendirme süreçlerinin daha standart hale getirilmesi, metodolojik yanlılığı azaltarak daha nesnel sonuçlar elde edilmesine katkı sağlayabilir.

Çalışmamızda, hastaların daha uzun dönemdeki takipleri yapılamamış olup, bu durum tedavi yöntemlerinin uzun vadeli etkinliğini ve olası komplikasyonların sıklığını değerlendirme açısından önemli bir kısıtlılık oluşturmaktadır. Daha uzun takip süreleri, tedaviye bağlı iyileşmenin sürdürülebilirliğini ve geç dönem komplikasyonların (örneğin, fasya zayıflığı, nüks eden ağrı) daha doğru tespit edilmesini sağlayabilir. Bu nedenle, daha uzun süreli takip içeren çalışmaların planlanması, tedavi yöntemlerinin uzun vadeli başarısını ve olası komplikasyonları daha net ortaya koyacaktır.

Bu çalışmada, hem ESWT hem de minimal invaziv cerrahi tekniklerinin plantar fasiit tedavisinde başarılı klinik sonuçlar sağladığı gözlemlenmiştir. Karşılaştırmalı analizler, ESWT uygulanan hastalarda birinci yıl itibarıyla klinik iyileşmede belirli bir gerileme olduğunu ortaya koysa da, hastaların işlem öncesi durumlarıyla kıyaslandığında klinik iyilik hallerinin anlamlı derecede daha iyi olduğu belirlenmiştir.

Özellikle erken dönemde cerrahi tedavi ile karşılaştırılabilir klinik sonuçlar sunması, erken dönemde öngörülebilir maliyet etkinliği ve uygulama kolaylığı gibi faktörler göz önüne alındığında, ESWT'nin minimal invaziv cerrahi girişimlerden önce tercih edilebilecek etkili bir tedavi seçeneği olduğu düşünülmektedir. Gelecekte, daha geniş hasta popülasyonları ile yürütülecek daha uzun dönem takip çalışmalarının, bu tedavi yöntemlerinin uzun vadeli etkinliklerini ve optimal tedavi algoritmalarındaki yerlerini daha kesin bir şekilde belirlemeye katkı sağlayacağı düşünülmektedir.

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Examining the Link Between Impulsivity, Internet Addiction, Cyberbullying, and Cybervictimization Among Adolescents in a Child and Adolescent Psychiatry Outpatient Clinic

Çocuk ve Ergen Psikiyatrisi Kliniğindeki Ergenlerde Dürtüsellik, İnternet Bağımlılığı, Siber Zorbalık ve Siber Mağduriyet Arasındaki İlişkinin Araştırılması

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Abstract: This study investigated the connections between Internet addiction, impulsivity, cyberbullying, and cybervictimization in adolescents aged 12 to 18 years who sought care at a university hospital's child and adolescent psychiatry outpatient clinic. This study involved 283 adolescents. The Internet Addiction Test (IAT), the Barratt Impulsiveness Scale-11 (BIS-11), and the Revised Cyberbullying Inventory-II (RCBI-II) were administered to participants who fulfilled the inclusion and exclusion criteria and consented to join the study. Analyses were conducted by dividing the IAT total scores according to the cut-off value and grouping the RCBI-II-CB and RCBI-II-CV scores as 10 or greater. Among adolescents with Internet addiction, statistically significant higher scores were observed across all the aforementioned scales and inventories. Correlation tests revealed significant associations among all these scales and inventories. Furthermore, logistic regression analyses demonstrated that impulsivity had a significant effect on both Internet addiction and cyberbullying as well as cybervictimization. Internet addiction was found to have a significant impact on both cyberbullying and cybervictimization. Additionally, cyberbullying and cybervictimization were shown to have significant effects on each other. However, cyberbullying and cybervictimization were not found to have a significant effect on Internet addiction. This research contributes valuable insights to the literature by presenting findings consistent with prior studies while also introducing divergent results that enhance and broaden the current understanding. These differences serve as a foundation for future research, offering valuable guidance for further studies.
Keywords: Internet Addiction, Impulsivity, Cyberbullying, Cybervictimization

Özet: Bu çalışmada bir üniversite hastanesinin çocuk ve ergen psikiyatri polikliniğine başvuran 12-18 yaş arası ergenlerde internet bağımlılığı, dürtüsellik, siber zorbalık ve siber mağduriyet arasındaki bağlantılar araştırılmıştır. Çalışmaya 283 ergen katılmıştır. Dahil etme ve dışlama kriterlerini karşılayan ve çalışmaya katılmayı kabul eden katılımcılara İnternet Bağımlılığı Testi (IAT), Barratt Dürtüsellik Ölçeği-11 (BIS-11) ve Revize Siber Zorbalık Envanteri-II (RCBI-II) uygulandı. Analizler, IAT toplam puanlarının kesme değerine göre ve RCBI-II-CB ve RCBI-II-CV puanlarının 10 veya daha büyük olacak şekilde gruplandırılması ile gerçekleştirilmiştir. İnternet bağımlılığı olan ergenlerde, yukarıda belirtilen tüm ölçeklerde ve envanterlerde istatistiksel olarak anlamlı derecede yüksek puanlar saptanmıştır. Korelasyon testleri, bu ölçekler ve envanterler arasında anlamlı ilişkiler olduğunu göstermiştir. Ayrıca, lojistik regresyon analizleri, dürtüselliğin hem internet bağımlılığı hem de siber zorbalık ve siber mağduriyet üzerinde anlamlı bir etkisinin olduğunu ortaya koymuştur. İnternet bağımlılığının hem siber zorbalık hem de siber mağduriyet üzerinde anlamlı bir etkisi bulunmuştur. Bunun yanı sıra, siber zorbalık ve siber mağduriyetin birbirleri üzerinde anlamlı etkilerinin olduğu saptanmıştır. Ancak, siber zorbalık ve siber mağduriyetin internet bağımlılığı üzerinde anlamlı bir etkisinin olmadığı belirlenmiştir. Bu çalışma, önceki bulgularla uyumlu sonuçlar sunarak literatüre önemli bir katkı sağlarken, aynı zamanda farklı sonuçlarıyla da mevcut bilgi birikimini zenginleştirmekte ve gelecekteki araştırmalara değerli bir rehber olmaktadır.
Anahtar Kelimeler: İnternet Bağımlılığı, İmpulsivite, Siber Zorbalık, Siber Mağduriyet

Ethics Committee Approval: This study adhered to the principles outlined in the Declaration of Helsinki. Ethical approval was granted by the Ethics Committee of Afyonkarahisar Health Sciences University Faculty of Medicine on September 6, 2024 (approval number: 2024/308).

Informed Consent: All participants and their parents provided both verbal and written informed consent to participate in the study.

Authorship Contributions Medical Practices: YÖ, ÇÇS, AGÖ. Concept: YÖ, ÇÇS. Design: YÖ, ÇÇS. Data, Collection or Processing: YÖ, ÇÇS, AGÖ, AK, HGG. Analysis or Interpretation: YÖ, ÇÇS, AGÖ, AK, HGG. Literature Search: YÖ, ÇÇS, AK, HGG. Writing: YÖ, ÇÇS, AK, HGG.

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1. Introduction

In recent times, there has been a notable increase in Internet and social media usage, especially among adolescents (1). Currently, over half of the global population actively uses platforms like WhatsApp, WeChat, Facebook, and Instagram (2). Similarly, in Turkey, active social media users—primarily utilizing Facebook, YouTube, WhatsApp, Facebook Messenger, WeChat, QQ, and Instagram—constitute 63% of the population, significantly exceeding the global average of 39% (3). This growing trend has coincided with an increase in problematic Internet use, often referred to as Internet addiction. Defined as excessive and uncontrollable Internet use that disrupts daily functioning and causes significant life challenges, Internet addiction has become a critical public health issue (4). Adolescents are particularly vulnerable, with prevalence rates ranging from 20% to 26.5% in this age group (5). While social media offers numerous benefits, excessive or problematic use has been linked to various mental health issues, including depression, ADHD, substance use disorders, eating disorders, anxiety, social anxiety, low self-esteem, and reduced life satisfaction and well-being (6, 7, 8). Moreover, the extensive integration of social media into daily life has been linked to heightened peer bullying and victimization, leading to an increase in cyberbullying and cybervictimization, as highlighted in recent research (7, 8, 9, 10).

Cyberbullying is commonly defined as deliberate, repeated acts of aggression intended to threaten, harass, or humiliate others, conducted through electronic communication channels (11). Unlike traditional bullying, cyberbullying operates in a virtual environment where unrestricted expression often lacks social oversight, allowing it to reach a wider audience (12). Moreover, the anonymity afforded to perpetrators can intensify harmful behaviors, enabling them to target victims without facing direct accountability (13). Cybervictimization, conversely, refers to the experiences of individuals subjected to cyberbullying (14). Additionally, cybervictims are often found to engage in cyberbullying behaviors themselves, suggesting a bidirectional relationship (15). Prevalence rates for cyberbullying and cybervictimization in Western countries range from 4% to 56% and 6% to 72%, respectively (16, 17). Among Turkish adolescents, studies report prevalence rates ranging from 6.4% to 47.6% for engaging in cyberbullying behaviors and from 5.1% to 56% for experiencing cybervictimization (18, 19). A study conducted in Türkiye in 2019 reported that the prevalence of cybervictimization and cyberbullying was 62.6% and 53.3%, respectively (20). Similarly, a more recent study in 2021 found that the prevalence of cyberbullying among high school students was 65.3% (21). Research highlights strong associations between cybervictimization and issues such as low self-esteem, anxiety, depressive symptoms, and suicidal ideation (22). Cultural factors significantly influence the underlying causes of cyberbullying and cybervictimization. A meta-analysis of 81 empirical studies identified risky technology use and psychological factors, including depression and anxiety, as key predictors (23). Furthermore, social and cognitive elements, such as empathy, moral disengagement, feelings of responsibility, and schemas related to mistrust and inadequacy, were linked to increased vulnerability to both behaviors (24).

Impulsivity is characterized by a predisposition to make hasty decisions without thoroughly evaluating possible adverse outcomes and to act swiftly on these choices. It encompasses behaviors performed without adequate reflection, instinctive actions devoid of conscious judgment, and swift mental responses lacking foresight. Impulsivity is a multidimensional construct, incorporating aspects such as present-focused thinking, difficulty delaying gratification, heightened sensitivity, risk-taking, impatience, pleasure-seeking, and reward responsiveness. It also involves acting impulsively without evaluating whether the action represents the best possible choice (25, 26). In the digital context, impulsivity can manifest as impulsive cyberbehavior. Individuals with higher impulsivity levels often struggle to regulate their Internet use, making impulsivity a potential risk factor for Internet addiction disorder (IAD) (26). Studies suggest a link between poor impulse control and compulsive Internet use, with such individuals more likely to exhibit aggressive behaviors online. For instance, among Greek adolescents, impulsive problematic Internet use was identified as an independent predictor of cyberbullying perpetration (27). A systematic review of meta-analyses revealed that low technology use served as a strong protective factor against cyberbullying (28). Similarly, research by Zych et al. (2019b) demonstrated that problematic Internet use predicted cyberbullying perpetration six months later in Spanish adolescents (29). These findings indicate that compulsive Internet use is a significant individual risk factor for cyberbullying and may mediate the relationship between impulsivity and cyberbullying.

As discussed, impulsivity, Internet addiction, cyberbullying, and cybervictimization are interconnected. However, no existing studies have comprehensively examined the relationships among these variables in adolescents. This study explored the connections between Internet addiction, impulsivity, cyberbullying, and cybervictimization in adolescents who sought care at a university hospital's child and adolescent psychiatry outpatient clinic.

The research sought to answer two primary questions: (a) Are there significant differences in cyberbullying, cybervictimization, and impulsivity when comparing adolescents who have Internet addiction to those who do not? (b) Is there a significant correlation among Internet addiction, cyberbullying, cybervictimization, and impulsivity?

2. Materials and Methods

2.1. Participants and Research Structure

The study, conducted at a single center between September 2024 and January 2025, utilized a cross-sectional design and included adolescents aged 12 to 18 years who presented to the Child and Adolescent Psychiatry Outpatient Clinic at the Faculty of Medicine, Afyonkarahisar Health Sciences University.

The objectives and procedures of the study were thoroughly explained to both the adolescent participants and their parents, and informed consent was acquired in both verbal and written form from all involved parties. The study sample consisted of 283 patients who had no active psychotic symptoms, no pervasive developmental disorders, and sufficient mental capacity to complete the required questionnaires. These psychiatric diagnoses were excluded from the study based on clinical observation and evaluation in accordance with DSM-5 criteria. Each participant was provided with a sociodemographic questionnaire by a clinician, followed by the completion of the Internet Addiction Test (IAT), the Barratt Impulsivity Scale (BIS-11), and the Revised Cyberbullying Inventory-II (RCBI-II) by the adolescents.

2.2. Data Collection Tools

2.2.1. Sociodemographic Questionnaire: This form was specifically designed by the researchers to gather sociodemographic details from participants, such as their age and gender.

2.2.2. Internet Addiction Test (IAT): Originally developed by Young, the IAT assesses Internet usage patterns and addiction severity. The scale comprises 20 items rated on a 5-point Likert scale, where higher scores reflect increased severity of addiction. (30). Total scores are categorized as follows: 0–30 (normal use), 31–49 (mild addiction), 50–79 (moderate addiction), and 80–100 (severe addiction) (31). In the Turkish version of the IAT, a total score exceeding 50 points is classified as pathological Internet use (32). Based on this classification, participants in this study were divided into two groups: the Internet addiction group (IAT score ≥ 50) and the non-addiction group (IAT score ≤ 49) (33). Bayraktar (2001) validated the Turkish adaptation, reporting a Cronbach's alpha of 0.91 and a Spearman-Brown coefficient of 0.87 (34).

2.2.3. Barratt Impulsivity Scale-11 (BIS-11): The BIS-11, created by Patton et al, evaluates impulsivity through 30 items scored on a 4-point Likert scale, ranging from 1 to 4. The scale evaluates three subdomains: non-planning, motor impulsivity, and cognitive impulsivity, with higher scores reflecting greater impulsivity (35). The Turkish version has undergone validity and reliability testing (36).

2.2.4. Revised Cyberbullying Inventory-II (RCBI-II): The RCBI-II, developed by Topcu and Erdur-Baker (2018), is a self-report measure assessing the severity of both cyberbullying (RCBI-II-CB) and cybervictimization (RCBI-II-CV) in adolescents aged 14–18 (37). The scale includes 10 items, each rated twice by participants—once for reporting cyberbullying behaviors ("I did it") and once for victimization experiences ("It happened to me"). An example item is "Sending embarrassing or hurtful messages." Each dimension is rated on a 4-point Likert scale: 1 (none), 2 (once), 3 (two to three times), and 4 (more than three times). The scores vary between 10 and 40, with higher values reflecting increased experiences of cyberbullying or cybervictimization. Categorical scoring is also possible to identify cyberbullies, victims, both, or uninvolved individuals. Participants scoring 10 or higher are categorized as uninvolved. The Turkish version demonstrated strong internal consistency, with Cronbach's $\alpha = .80$ for cybervictimization and Cronbach's $\alpha = .79$ for cyberbullying.

2.3. Statistical Analysis

The statistical analysis was performed with SPSS software, version 26.0. Descriptive statistics were utilized to assess the demographic characteristics of

the sample. Depending on whether the data distribution was normal, either the Mann-Whitney U-test or the Student's t-test were used to compare groups for total IAT scores, divided by the cutoff value. To explore the relationships between variables, Spearman correlation analysis was utilized. Factors identified as significant in earlier analyses were included in logistic regression models to identify independent predictors of Internet addiction in a multivariate context. With RCBI-II-CB and RCBI-II-CV scores classified as 10 or higher, logistic regression analyses were performed to investigate the effects of the research factors on cyberbullying and cybervictimization. Statistical significance was determined at a Type I error level of <5%.

3. Results

A total of 283 adolescents were evaluated, consisting of 185 females (65.4%) and 98 males (34.6%) with a mean age of 15.03 ± 1.8 years.

Based on the IAT threshold score, the study participants were split into two groups: 87 adolescents (30.7%) in the Internet addiction group (IAT score ≥ 50) and 196 adolescents (69.3%) in the non-addiction group (IAT score ≤ 49). The gender distribution (χ^2 = 0.813, p = 0.056) and mean age (15.04 ± 0.18 years vs. 15.02 ± 0.13 years) (z = -0.068, p = 0.946) did not significantly differ between the two groups. There were no significant differences in paternal age (z = -1.394, p = 0.163) or maternal age (z = -1.730, p = 0.084) between the two groups. There were no statistically significant difference in paternal educational level ($\chi^2(4) = 3.41$, p = 0.492) or maternal educational level ($\chi^2(6) = 11.12$, p = 0.085) between the two groups.

The Internet addiction group demonstrated significantly higher scores compared to the non-addiction group across various measures, including the total IAT score (p < 0.001), total BIS-11 score (p < 0.001), BIS-11 cognitive impulsivity subscale score (p < 0.001), BIS-11 non-planning subscale score (p < 0.001), BIS-11 motor impulsivity subscale score (p < 0.001), RCBI-II-CB score (p < 0.001), and RCBI-II-CV score (p < 0.001) (Table 1).

Table 1. Comparison of the mean scores for the IAT total, BIS-11 total and subscales, RCBI-II-CB, and RCBI-II-CV across groups categorized by the presence or absence of Internet addiction.

	Presence of Internet Addiction (n=87)		**Absence of Internet Addiction (n=196)**			
	Mean	**SD**	**Mean**	**SD**	**z**	**p***
IAT total score	66.60	1.51	28.71	0.90	-13.424	**<0.001**
BIS-11 total score	79.40	1.09	67.06	0.83	-7.999	**<0.001**
BIS-11 cognitive impulsivity subscale score	21.97	0.41	17.90	0.31	-6.942	**<0.001**
BIS-11 non-planning subscale score	32.44	0.44	27.78	0.37	-7.089	**<0.001**
BIS-11 motor impulsivity subscale score	24.97	0.59	21.37	0.35	-5.099	**<0.001**
RCBI-II-CB score	16.83	0.71	12.80	0.27	-5.393	**<0.001**
RCBI-II-CV score	17.43	0.72	13.45	0.31	-4.941	**<0.001**

*SD: standard deviation; *Mann Whitney U-test*

IAT: Internet Addiciton Test; BIS-11: Barratt Impulsivity Scale- 11; RCBI-II-CB: Revised Cyberbullying Inventory-II Cyberbullying; RCBI-II-CV: Revised Cyberbullying Inventory-II Cybervictimization

The findings of the Spearman correlation analysis demonstrated that all scale scores, including the IAT total, BIS-11 total and its subscales, RCBI-II-CB, and RCBI-II-CV, were significantly positively correlated with each other (p < 0.001). The relationship between the RCBI-II-CV and BIS-11 motor impulsivity subscale scores was weak, whereas all other relationships were moderate to strong. Detailed results are presented in Table 2.

Table 2. Results of the Spearman correlation analysis examining the relationships between the IAT, BIS-11, RCBI-II-CB, and RCBI-II-CV scores among all participants (n = 283).

	1	2	3	4	5	6	7
1. IAT total	1						
2. BIS-11 total	.524**	1					
3. BIS-11 cognitive impulsivity	.490**	.830**	1				
4. BIS-11 non-planning	.422**	.758**	.464**	1			
5. BIS-11 motor impulsivity	.357**	.811**	.608**	.377**	1		
6. RCBI-II-CB	.406**	.498**	.458**	.362**	.402**	1	
7. RCBI-II-CV	.384**	.398**	.388**	.324**	.266**	.723**	1

*Spearman Correlation; ** p<0.001*
IAT: Internet Addiciton Test; BIS-11: Barratt Impulsivity Scale- 11; RCBI-II-CB: Revised Cyberbullying Inventory-II Cyberbullying; RCBI-II-CV: Revised Cyberbullying Inventory-II Cybervictimization

The relationships between Internet addiction and age, gender, BIS-11 total scores, RCBI-II-CB scores, and RCBI-II-CV scores were investigated using logistic regression analysis. The results showed that total impulsivity scores were significantly and positively associated with Internet addiction (B = 0.079, Exp(B) = 1.083, p < 0.001). Specifically, each unit increase in impulsivity score was associated with an 8.3% increase in the odds of Internet addiction (Table 3).

Table 3. Results of the Logistic Regression Analysis of BIS-11 total scores, RCBI-II-CB scores, and RCBI-II-CV scores to identify factors associated with Internet addiction.

	B	**Std. Error**	**p**	**Exp(B)**	**Cox & Snell R2**
					0.222
Gender	0.053	0.323	0.869	1.055	
Age	0.007	0.086	0.936	1.007	
BIS-11 total scores	0.079	0.015	**<0.001**	1.083	
RCBI-II-CB scores	0.023	0.042	0.179	1.023	
RCBI-II-CV scores	0.064	0.035	0.109	1.066	

IAT: Internet Addiciton Test; BIS-11: Barratt Impulsivity Scale- 11; RCBI-II-CB: Revised Cyberbullying Inventory-II Cyberbullying; RCBI-II-CV: Revised Cyberbullying Inventory-II Cybervictimization

To assess the impact of the study parameters on cyberbullying, the RCBI-II-CB scores were categorized into two groups: those scoring 10 and those scoring above 10. To investigate the relationships between cyberbullying and age, gender, BIS-11 total scores, IAT total scores, and RCBI-II-CV scores, logistic regression analyses were conducted. The findings revealed that higher levels of impulsivity (B = 0.057, Exp(B) = 1.059, p < 0.001), Internet addiction (B = 0.016, Exp(B) = 1.016, p = 0.014), and cybervictimization (B = 0.485, Exp(B) = 1.624, p < 0.001) were significantly and positively associated with cyberbullying. These findings indicate that increases in impulsivity, Internet addiction, and experiences of cybervictimization increase the likelihood of engaging in cyberbullying behaviors (Table 4).

Table 4. Results of the Logistic Regression Analysis of BIS-11 total scores, IAT total scores, and RCBI-II-CV scores to identify factors associated with cyberbullying.

	B	**Std. Error**	**p**	**Exp(B)**	**Cox & Snell R2**
					0.404
Gender	0.365	0.288	0.205	0.694	
Age	0.155	0.075	0.139	1.168	
BIS-11 total scores	0.057	0.14	**<0.001**	1.059	
IAT total scores	0.016	0.08	**0.014**	1.016	
RCBI-II-CV scores	0.485	0.069	**<0.001**	1.624	

IAT: Internet Addiciton Test; BIS-11: Barratt Impulsivity Scale- 11; RCBI-II-CB: Revised Cyberbullying Inventory-II Cyberbullying; RCBI-II-CV: Revised Cyberbullying Inventory-II Cybervictimization

To assess the impact of the study parameters on cybervictimization, the RCBI-II-CV scores were categorized into two groups: those scoring 10 and those scoring above 10. To investigate the relationships between cybervictimization and age, gender, BIS-11 total scores, IAT total scores, and RCBI-II-CB scores, logistic regression analyses were conducted. The results demonstrated that impulsivity (B = 0.041, Exp(B) = 1.042, p = 0.04), Internet addiction (B = 0.015, Exp(B) = 1.015, p = 0.025), and cyberbullying perpetration (B = 0.562, Exp(B) = 1.754, p < 0.001) were significantly and positively associated with cybervictimization. These findings suggest that adolescents with higher impulsivity and Internet addiction levels, as well as those who engage in cyberbullying, are at increased risk of becoming cybervictims (Table 5).

Table 5. Results of the Logistic Regression Analysis of BIS-11 total scores, IAT total scores, and RCBI-II-CB scores to identify factors associated with cybervictimization.

	B	**Std. Error**	**p**	**Exp(B)**	**Cox & Snell R2**
					0.341
Gender	0.210	0.277	0.449	1.233	
Age	0.046	0.072	0.527	1.047	
BIS-11 total scores	0.041	0.013	**0.04**	1.042	
IAT total scores	0.015	0.008	**0.025**	1.015	
RCBI-II-CB scores	0.562	0.084	**<0.001**	1.754	

IAT: Internet Addiciton Test; BIS-11: Barratt Impulsivity Scale- 11; RCBI-II-CB: Revised Cyberbullying Inventory-II Cyberbullying; RCBI-II-CV: Revised Cyberbullying Inventory-II Cybervictimization

4. Discussion

To summarize the findings of this study, significant associations were identified between impulsivity, types of impulsivity, cyberbullying, and cybervictimization when comparing the group with Internet addiction, as determined by IAT total score cutoffs, to the group without Internet addiction. Furthermore, correlation analyses revealed significant positive correlations among Internet addiction, impulsivity, types of impulsivity, cyberbullying, and cybervictimization. Additionally, logistic regression analyses demonstrated that impulsivity had a significant effect on Internet addiction, whereas cyberbullying and cybervictimization did not show such an effect. Moreover, impulsivity, Internet addiction, and cybervictimization were found to have significant effects on cyberbullying, while impulsivity, Internet addiction, and cyberbullying had significant effects on cybervictimization.

Previous studies have similarly reported higher levels of impulsivity among adolescents with Internet addiction compared to their non-addicted peers, aligning with the findings of the present study (38, 39). Regression analysis in this study revealed a significant association between Internet addiction and impulsivity. Based on DSM-IV criteria, some researchers have proposed that Internet addiction represents a disorder related to impulse control (39). Impulsivity is often considered an endophenotype in individuals predisposed to addiction, particularly substance abuse and pathological gambling (40). Internet addiction is characterized by difficulty in regulating internet use, while impulsivity refers to acting hastily without prior thought, reflecting reduced cognitive control. It has been suggested that impulsivity may hinder the inhibition of addictive behaviors (41). Adolescents, being more impulsive and exhibiting weaker self-regulatory skills during this developmental stage, may face a heightened risk of Internet addiction (5). To date, limited research has explored the association between Internet addiction and impulsivity specifically within the adolescent population. In light of this evidence, the findings of this study underscore that impulsivity in adolescents may play a critical role in Internet addiction, with impulsivity traits representing a potential risk factor for developing such addiction. Moreover, this study identified a significant moderate correlation between impulsivity and both cyberbullying and cybervictimization. It was also found that impulsivity had a significant impact on cyberbullying and cybervictimization, indicating that impulsivity serves as a predictor for these situations. These findings corroborate those reported in prior research (42, 43, 44). Given the link between aggression and bullying behavior, much of the research has focused on the impulsivity of bullies. However, studies on victimization have also demonstrated that victims exhibit externalizing behaviors, such as impulsivity (44).

The significant relationship and moderate positive correlation observed between Internet addiction, cyberbullying, and cybervictimization in this study align with findings reported in the literature (7, 45,

46). Furthermore, this study demonstrated that Internet addiction has a significant impact on both cyberbullying and cybervictimization. However, the reverse effect was not observed, as neither cyberbullying nor cybervictimization had a significant influence on Internet addiction. In other words, while Internet addiction predicts cyberbullying and cybervictimization, the opposite does not appear to hold true. This finding, which does not entirely align with the existing literature, suggests that adolescents who engage in cyberbullying or experience cybervictimization may not necessarily have Internet addiction. However, adolescents with Internet addiction are at a higher risk of both perpetrating cyberbullying and being victims of cybervictimization. This supports the findings of other studies in the literature, which indicate that cyberbullying and cybervictimization are influenced by numerous factors, including anxiety, depression, self-esteem, empathy, personality traits, family characteristics, and more (47, 48, 49) . Internet addiction has been identified as a risk factor for both engaging in cyberbullying and experiencing cybervictimization. Several explanations may account for this association. First, excessive Internet use has been shown to correlate with a heightened likelihood of cyberbullying behaviors (50). Second, Internet addiction, often characterized as an "impulse control disorder," has been associated with a broad range of psychosocial issues, including involvement in cyberbullying (51). Third, research has highlighted a connection between cybervictimization and Internet addiction. For instance, a study conducted in China revealed a bidirectional relationship between cybervictimization and Internet use. Lastly, extended online activity (exceeding two hours per day) has been demonstrated to significantly increase the risk of encountering cyberbullying (52). Alim (2017) highlighted that sharing personal information on social media increases an individual's vulnerability to cyberbullying (53). Furthermore, this study identified a strong positive correlation between cyberbullying and cybervictimization, as well as significant effects between them. These findings corroborate those reported in prior research. Lozano-Blasco, Cortés-Pascual, and Latorre-Martínez (2020) reported a moderate positive correlation between cyberbullying and cybervictimization among adolescents (54). Similarly, Brewer and Kerslake (2015) suggested that cybervictimization often results from cyberbullying (48). These findings imply that individuals who experience cyberbullying may develop a tendency to inflict harm on others as a coping mechanism, perceiving bullying as a way to respond to their own victimization.

No prior study in the literature has simultaneously examined Internet addiction, impulsivity, cyberbullying, and cybervictimization among adolescents. This distinction represents a significant strength of the present study. Moreover, this study makes a significant contribution to the literature by providing results that align with previous findings while also enriching the existing body of knowledge through its divergent findings. These differences serve as a foundation for future research, offering valuable guidance for further studies. Future research exploring the interrelationships between these variables could contribute to a deeper understanding of the mechanisms underlying these critical issues in adolescence and aid in the development of effective intervention strategies.

Nonetheless, this study has notable limitations. The key limitations include its cross-sectional design and a relatively small sample size, which hinder the broader applicability of the results. An important limitation of the study is the lack of assessment of participants' sociodemographic characteristics, such as family background, ownership of personal electronic devices (e.g., mobile phones and computers), and academic performance. Additionally, the use of self-reported scales for assessing Internet addiction, impulsivity, cyberbullying, and cybervictimization may introduce bias. Another limitation is the lack of objective intelligence testing to evaluate the mental capacity of the participants. Although exclusion criteria included psychotic disorders, pervasive developmental disorders, and intellectual disabilities, these conditions were not assessed using a semi-structured psychiatric interview such as the Kiddie and Young Adult Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version (K-SADS-PL), but rather based on clinical observation and evaluation in accordance with DSM-5 criteria.

5. Conclusion

In summary, the results of this study revealed significant associations between impulsivity, its various types, cyberbullying, and cybervictimization when comparing the group with Internet addiction (based on IAT total score cutoffs) to the group without Internet addiction. Correlation analyses further showed significant positive relationships among Internet addiction, impulsivity, its types, cyberbullying, and cybervictimization. Additionally,

logistic regression analyses indicated that impulsivity had a significant impact on Internet addiction, while cyberbullying and cybervictimization did not exhibit such an effect. Furthermore, impulsivity, Internet addiction, and cybervictimization were found to significantly influence cyberbullying, while impulsivity, Internet addiction, and cyberbullying had significant effects on cybervictimization. Nevertheless, additional studies are essential to explore the fundamental processes behind Internet addiction, impulsivity, cyberbullying, and cybervictimization, which are commonly observed during adolescence, as well as the relationships among these factors.

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Pediatristlerin İnme Konusunda Farkındalık, İlgi ve Bilgi Düzeylerinin Değerlendirilmesi

Evaluation of Pediatricians' Awareness, Interest and Knowledge Levels Regarding Stroke

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Etik Kurul Onayı: Çalışma Eskişehir Osmangazi Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu tarafından onaylanmıştır (Karar No: 15 Tarih:28.11.2024)
Onam: Yazarlar çalışma için katılımcılardan Bilgilendirilmiş Gönüllü Formu aldıklarını beyan etmişlerdir.
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Abstract: Acute childhood stroke is a medical emergency requiring a high level of awareness. This study aims to evaluate pediatricians' awareness, interest, and knowledge regarding childhood stroke. Physicians working in various centers across Turkey were invited via email to participate in an online survey on childhood stroke. The study was conducted with a total of 133 participants. Among them, 86 (64.7%) were pediatric residents, and 47 (35.3%) were pediatric specialists. A total of 42.1% of participants reported considering childhood stroke as a diagnosis at least once in the past year, and 39.8% stated that they had been involved in the follow-up and treatment of patients with childhood stroke. The FAST (Face-Arm-Speech-Time) mnemonic, used for recognizing stroke symptoms, was known by 50.4% of pediatricians. The most frequently reported symptoms of childhood stroke were hemiparesis (55.6%), altered consciousness (36.1%), speech disorders (30.1%), seizures (28.6%), visual impairment (20.3%), headache (15%), and syncope (6.8%). The most common stroke mimics identified were central nervous system infections (40.6%), seizures (21.1%), hypoglycemia (8.3%), and migraines (7.5%). The primary diagnostic tools used were magnetic resonance imaging (MRI) (55.6%) and computed tomography (CT) (42.9%). The main treatment strategies included anticoagulants (39.1%), thrombolytics (22.6%), antiplatelets (11.3%), and thrombectomy (6%). Among the participants, 81.7% had conducted online research on childhood stroke, 15.9% had discussed the topic with colleagues, and 2.4% had attended educational sessions. Early diagnosis and treatment of childhood stroke are crucial for prognosis. Increasing pediatricians' awareness and knowledge on this topic is essential.
Keywords: Pediatrician, awereness, stroke, FAST, diagnosis and treatment

Özet: Akut çocukluk çağı inmesi, yüksek düzeyde farkındalık gerektiren acil bir durumdur. Bu çalışma, pediatristlerin çocukluk çağı inmesi konusundaki farkındalığının, ilgi ve bilgisinin değerlendirilmesi amacıyla hazırlanmıştır. Türkiye'nin çeşitli merkezlerinde çalışan doktorlar e-posta yoluyla çocukluk çağı inmesi hakkında online bir ankete davet edildi. Çalışma toplam yüz otuz üç katılımcıyla gerçekleştirildi. Çalışmaya katılanların 86'sı pediatri asistanı (%64,7) ve 47'si pediatri uzmanı (%35.3) olarak görev yapmaktadır. Katılımcıların %42,1'i geçtiğimiz yıl içinde en az bir kez çocukluk çağı inmesini tanı olarak düşündüklerini belirttiler ve %39,8'i çocukluk çağında inme geçirmiş hastaların takip ve tedavilerini yaptıklarını ifade ettiler. İnmenin semptomatik kısaltması olarak adlandırılan FAST (Face-Arm-Speech-Time-Test) anımsatıcısı pediatristlerin %50,4'ü tarafından duyulmuştur. Katılımcılar tarafından çocukluk çağı inmesinin en sık semptomları hemiparezi (%55,6), bilinç bulanıklığı (%36,1), konuşma bozukluğu (%30,1), nöbet (%28,6), görme bozukluğu (%20,3), baş ağrısı (%15) ve senkop (%6,8) olarak belirtilmiştir. Merkezi sinir sistemi enfeksiyonları (%40,6), nöbet (%21,1), hipoglisemi (%8,3) ve migren (%7,5) en sık inme taklitleri olarak değerlendirilmiştir. Başlıca tanı ölçütleri manyetik rezonans görüntüleme (MRG) (%55,6) ve bilgisayarlı tomografi (BT) (%42,9) kullanılmaktadır. Ana tedavi stratejileri antikoagülan (%39,1), trombolitik (%22,6), antitrombositik (%11,3) ve trombektomi (%6) olarak saptanmıştır. Katılımcıların %81,7'si çocukluk çağı inmesi hakkında internet araştırması yapmış, %15,9'u meslektaşlarıyla tartışmış, %2,4'ü eğitim oturumlarına katılmıştır. Çocukluk çağı inmesinin erken tanı ve tedavisi prognoz açısından oldukça önemlidir. Pediatristlerin bu konuda farkındalık ve bilgi düzeyinin arttırılması gerekmektedir.
Anahtar Kelimeler: Pediatrist, farkındalık, inme, FAST, tanı ve tedavi

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1. Giriş

İnme, vasküler nedenlerle gelişen ve 24 saatten uzun süren fokal nörolojik defisit olarak tanımlanmaktadır (1). İnme, çocuklarda kronik morbidite ve mortaliteye yol açması nedeniyle önemli bir sağlık sorunudur (2). Akut inme pediatrik acil durumdur ve yüksek mortalite oranının (%10) yanı sıra hayatta kalanların ve ailelerinin yaşam kalitesi üzerinde önemli bir etkiye sahiptir (3,4). Arteriyel iskemik inme ve hemorajik inme olmak üzere iki tip vardır. Arteriyel iskemik inme (Aİİ), genellikle serebral arterlerin tromboembolizm nedeniyle tıkanması durumunda ortaya çıkar. Aİİ'nin etiyolojisi ve risk faktörlerinin çeşitliliği, klinik semptomları, hafif fokal bulguları tanımanın genel zorluğu nedeniyle tanı, tedavi ve sonuçlarında özgün sorunlar yaratır (5). Hemorajik inme serebral kan damarlarındaki rüptür sonucu ortaya çıkan ve nörolojik hasar ile karakterize bir serebrovasküler olaydır. Hemorajik inme yüksek mortalite ve tekrarlama riski nedeniyle önemli bir nörolojik acildir. En sık olarak intraserebral hemoraji (ISH) görülmektedir (6). Bu nedenle, çocukluk çağı inmesine ilişkin farkındalığı arttırma gerekliliği ortaya çıkmaktadır (7). Çocukluk çağı inmesine ilişkin mesleki farkındalık ve bilgi sistematik olarak değerlendirmelidir. Bu çalışmanın amacı, pediatristlerin çocukluk çağı inmesinin farkındalık oranı, bilgi düzeyinin arttırılmasına katkıda bulunmak ve çocukluk çağı inmesi konusunda etkin eğitim programlarının başarılı bir şekilde geliştirilmesini kolaylaştırmaktır.

2. Gereç ve Yöntem

Anket, araştırma grubumuzun pediatrik nöroloji uzmanları tarafından geliştirilmiştir. Anket içeriğinin netliğini ve teknik sağlamlığını kontrol etmek için araştırma grubumuz arasında 2 hafta boyunca uygulandı. Çevrimiçi anket 1 Eylül- 1 Aralık 2023 tarihleri arasında sürdürülmüştür. Bu çalışma yüz otuz üç katılımcıyla gerçekleştirilmiştir. Katılımcılara aydınlatılmış onam formu imzalatılmıştır. Davet gönderildikten sonra çevrimiçi anket 3 ay süreyle erişime açık kalmıştır. Her 2 haftada bir hatırlatma mesajı gönderilmiştir. Çalışma kapsamında katılımcı sayısı, araştırmanın uygulanabilirliği, hedef popülasyona erişilebilirlik ve gönüllülük ilkeleri doğrultusunda belirlenmiştir. Örneklem büyüklüğünü belirlemeye yönelik herhangi bir istatistiksel güç analizi anket soruları araştırmacılar tarafından oluşturulduğu için gerçekleştirilmemiş olup bu durum çalışmanın metodolojik sınırlılıkları arasında değerlendirilmiştir. Katılımcılar, Türkiye genelinde çeşitli sağlık kurumlarında aktif olarak görev yapan ve ankete gönüllü olarak katılım sağlayan pediatri uzmanı veya asistanı hekimlerden oluşmaktadır. Çalışma Helsinki Deklerasyon Prensipleri'ne uygun olarak yapılmıştır.

Anket

Anket tanıtıcı bilgiler, veri gizliliğinin korunmasına ilişkin katılımcıların onaylamasını gerektiren bir not ve anketin kendisi olmak üzere 3 bölümden oluşuyordu. Katılımcılara mesleki geçmişleri hakkında üç soru, çocukluk çağı inmesinin günlük mesleki rutinlerindeki önemi hakkında iki soru, çocukluk çağı inmesi konusunda inme tarama aracı yüz-kol-konuşma-zamanı testi (FAST) bilgisi, semptomlar, ayırıcı tanılar, akut çocukluk çağı inmesinin teşhis, tedavi ve yönetimini içeren yedi soru, daha önceki çocukluk çağı inmesi eğitim katılımları ve hekimlerin konuyla ilgili bilgi toplama yöntemleri hakkında üç soru sorulmuştur. Soru tipi konuya bağlı olarak farklılık göstermiştir. Anket Türkçe olarak uygulanmıştır.

Veri Yönetimi ve İstatistikler

Katılımcılar tarafından anket platformuna girilen tüm veriler merkezi olarak yeniden toplanmıştır. Daha ileri analizler için eksiksiz anketler değerlendirilmiştir. Verilerin tanımlayıcı istatistiklerinde ortalama, standart sapma, medyan en düşük, en yüksek, frekans ve oran değerleri kullanılmıştır. Analizlerde SPSS programı kullanılmıştır.

3. Bulgular

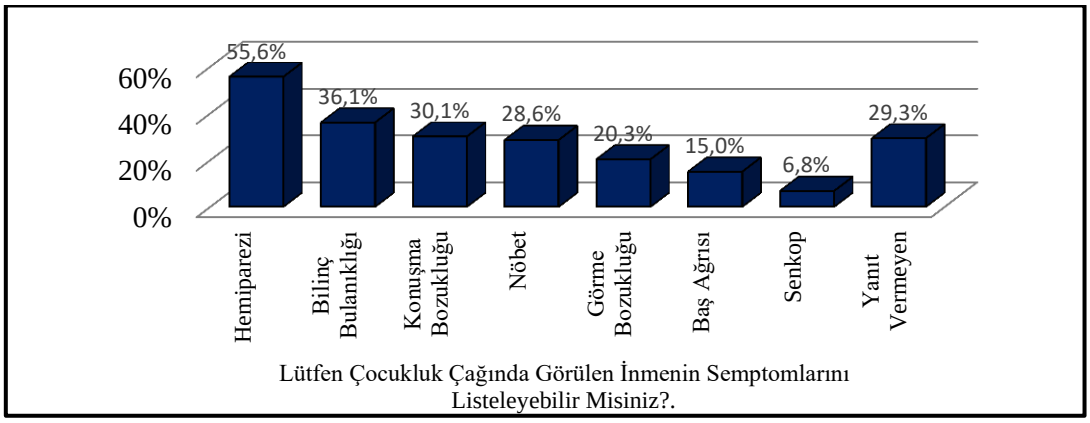
Bu çalışma yüz otuz üç katılımcı ile gerçekleştirilmiştir. Çalışmaya katılanların 79'u (%59,4) kadın, 54'ü (40,6) erkekti. Katılımcıların 86'sı pediatri asistanı (%64,7) ve 47'si pediatri uzmanı (%35.3) olarak görev yapmaktadır. Pediatri uzmanlık veya asistanlık süreleri 1 ila 348 ay arasında değişmekte olup, ortalama süre 59,2 ± 66,9 ay olarak bulunmuştur. Çalışmamızdaki on üç çocuk doktorunun (%9,8) üçü nöroloji (%2,3), üçü neonatoloji (%2,3), üçü endokrin (%2,3), biri yoğun bakım (%0,8), biri romatoloji (%0,8), biri nefroloji (%0,8), biri gastroenteroloji (%0,8) yandal uzmanıdır. Doktorların 67'si üniversite hastanelerinde (%50,4), 37'si eğitim araştırma hastanelerinde (%27,8), 20'si devlet hastanelerinde (%15) ve 9'u özel hastanelerde (%7) çalışmaktadır. Çalışmaya katılan pediatristlerin demografik verileri ve anket sorularına verilen cevaplar Tablo 1'de gösterilmiştir.

Tablo 1. Çalışmaya Katılan Pediatristlerin Demografik Verileri ve Anket Bulguları

		Min-Mak	Medyan	Ort.±ss/n-%	
Yaş		21.0 - 59.0	31.0	34.1 ±	8.3
Cinsiyet	Kadın			79	59.4%
	Erkek			54	40.6%
Mesleki Ünvanı	Asistan			86	64.7%
	Uzman			47	35.3%
Yan Dal Uzmanlık Alanı	Genel Pediatri Uzmanı			120	90.2%
	Neonatoloji			3	2.3%
	Nöroloji			3	2.3%
	Gastroenteroloji			1	0.8%
	Endokrin			3	2.3%
	Nefroloji			1	0.8%
	Yoğun Bakım			1	0.8%
	Romatoloji			1	0.8%
Son İhtisasınızı Nereden Aldınız/Almaktasınız?	EAH			28	21.1%
	Üniversite			105	78.9%
Şu Anda Hangi Merkezde Çalışmaktasınız?	EAH			37	27.8%
	Üniversite			67	50.4%
	Özel			9	6.8%
	Devlet Hastanesi			20	15.0%
Son 12 Ay İçinde Ne Sıklıkla Çocukluk Çağı İnmelerini Tanı Olarak Düşündünüz?	Hiç düşünmeyen			77	57.9%
	1-5 Kez			53	39.8%
	>5 Kez			3	2.3%
Çocukluk Çağında İnme Geçiren Çocukları Takip Ediyor Musunuz?	Evet			53	39.8%
	Hayır			80	60.2%
İnme Konusunda Anımsatıcı Olarak FAST'ı Duydunuz Mu?	Evet			29	21.8%
	Evet, Anlamını Hatırlamıyorum			38	28.6%
	Hayır			66	49.6%
Son Soruya "Evet" Yanıtı Verdiyseniz, Lütfen FAST Kısaltmasını Açılımını Yazabilir Misiniz?	FAST Açılımını Yazabilen			26	89.7%
	FAST Açılımını Yazamayan			3	10.3%
Lütfen Çocukluk Çağında Görülen İnmenin 4 Semptomunu Listeleyebilir Misiniz?	İnmenin 4 Semptomunu Listeleyebilen			87	65.4%
	İnmenin 4 Semptomunu Listeleyemeyen			46	34.6%
Lütfen Çocukluk Çağında Görülen İnmenin Kliniğine Benzer 3 Hastalık Listeleyebilir Misiniz?	İnme benzeri 3 hastalık Listeleyebilenler			76	57.1%
	İnme benzeri 3 hastalık Listeleyemeyenler			57	42.9%
Hangi Tanı Yöntemleri Çocukluk Çağı İnme Tanısını Doğrulamaya Katkıda Bulunur?	Tanı Yöntemi Belirtmeyen			41	30.8%
	1 Tanı Yöntemi Belirten			20	15.0%

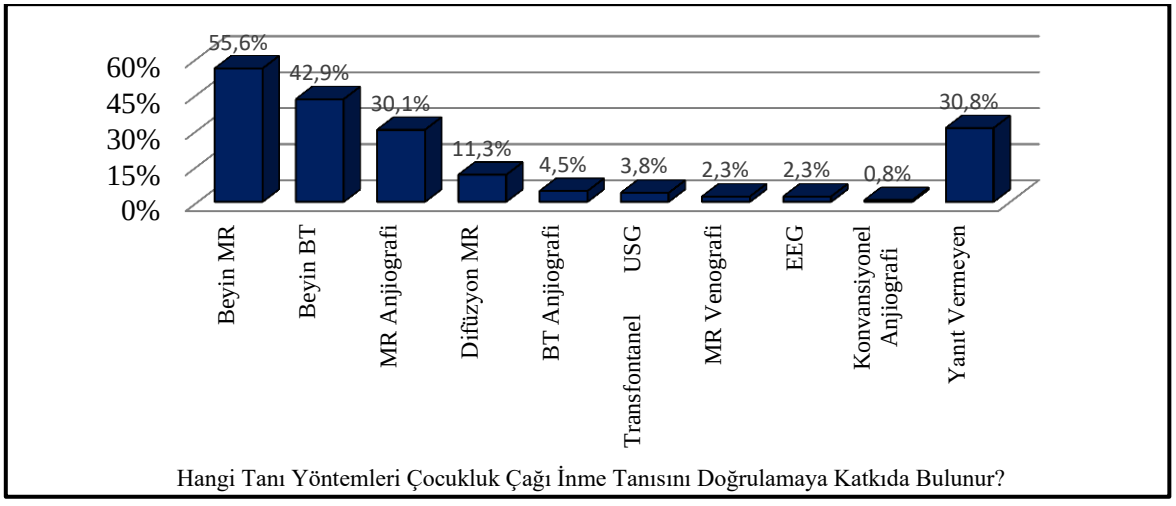
	2 Tanı Yöntemi Belirten	18	13.5%
	3 Tanı Yöntemi Belirten	54	40.6%
Çocukluk Çağı İnmede Akut Müdahale İçin Hangi Tedavi Seçeneklerini Biliyorsunuz?	Tedavi Seçeneği Belirtmeyen	68	51.1%
	DMAH	51	38.3%
	Aspirin	23	17.3%
	Trombolitik Tedavi	12	9.0%
	Girişimsel	6	4.5%
	Trombolitik	8	6.0%
Genellikle Çocukluk Çağında İnme Tanısı Ortalama Kaç Saat Sonra Doğrulanır?	Yanıtlamayan	17	12.8%
	İlk 1 Saat	5	3.8%
	1-6 Saat	67	50.4%
	6-12 Saat	16	12.0%
	12-24 Saat	14	10.5%
	24-48 Saat	14	10.5%
Daha Önce Pediatrik İnme Konulu Eğitimlere Katıldınız Mı?	Evet	12	9.0%
	Hayır	121	91.0%
Çocukluk Çağı İnme Konusunda Bir Eğitime Katılmak İster Misiniz?	Evet	115	86.5%
	Hayır	18	13.5%
Ne Tür Bir Eğitim Tercih Edersiniz?	Online	47	35.3%
	Yüz Yüze	77	57.9%
	Yayın	9	6.8%
İnme Konusunda Farklı Bilgi Kaynaklarını Kullanıyor Musunuz?	Evet	82	61.7%
	Hayır	51	38.3%

Katılımcıların 56'sı (%42,1) son bir yıl içinde en az bir hastada çocukluk çağı inmesini düşündüklerini söylemişlerdir. Çocukluk çağı inmesini son bir yıl içinde 53 (%39,8) pediatrist 1-5 kez ve 3 (%2,3) pediatrist en az 5 kez tanı olarak düşünmüştür. 53 katılımcı çocukluk çağı inmesi geçiren hastaların takip ve tedavilerini yaptıklarını ifade etmiştir (%39,8). FAST anımsatıcısı 67 katılımcı tarafından anketin (%50,4) çoktan seçmeli bölümünde teyit edilmiş ve anlamı 26 katılımcının (%89,7) serbest metin alanında doğru bir şekilde açıklanmıştır. Katılımcılar FAST'ı duyduklarını belirtmiş ancak 38'i (%28,6) açıklayamamıştır. Diğer 66 katılımcı tarafından ise FAST bilinmemektir (%49,6). Çocukluk çağı inmesinin dört semptomu katılımcıların 87'si (%65,4) tarafından belirtilmiş olup 46'sı (%34,6) serbest metin cevaplarda inmenin dört semptomunu sıralayamamıştır. En yaygın serbest metin cevapları hemiparezi (%55,6), bilinç bulanıklığı (%36,1), konuşma bozukluğu (%30,1), nöbet (%28,6), görme bozukluğu (%20,3), baş ağrısı (%15) ve senkop (%6,8) olmuştur. Çalışmamıza katılan pediatristler tarafından belirtilen çocukluk çağı inme semptomları Şekil 1'de gösterilmiştir.

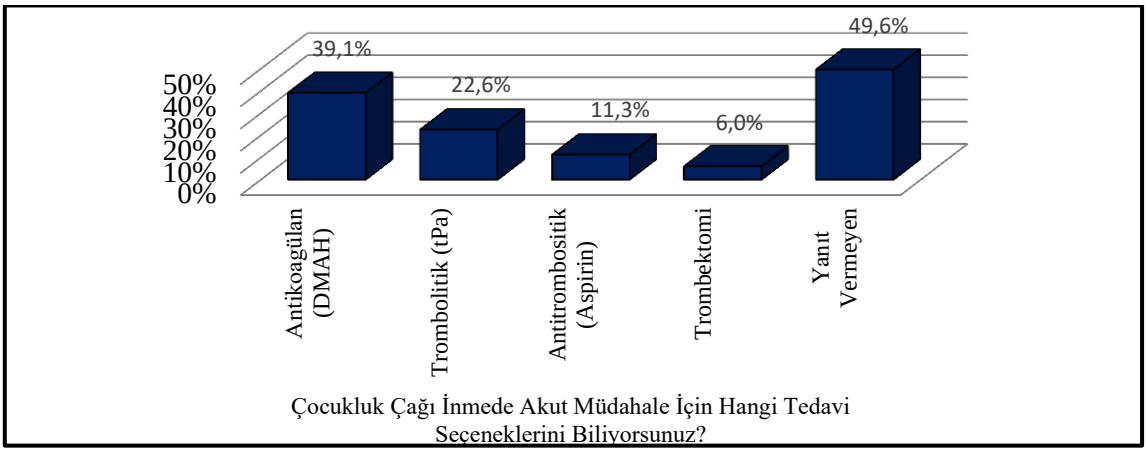


Şekil 1. Pediatristler Tarafından Belirtilen Çocukluk Çağı İnme Semptomları

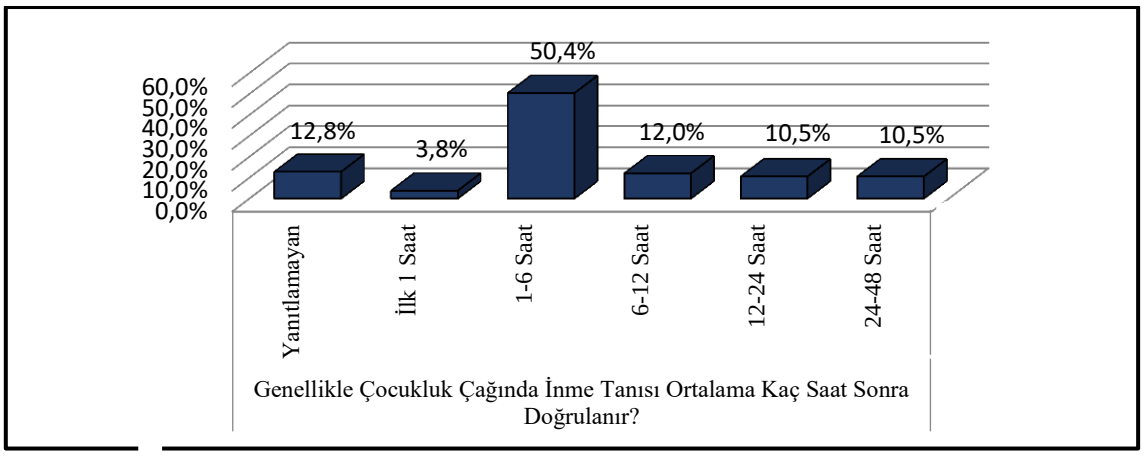
Merkezi sinir sistemi enfeksiyonları (%40,6), nöbet (%21,1), hipoglisemi (%8,3) ve migren (%7,5) en sık çocukluk çağı inmesini taklit eden en yaygın hastalıklar olarak belirtilmiştir. Çocukluk çağı inmesini doğrulamak için kullanılan tanı yöntemleri sorulduğunda katılımcıların 20'si (%15) bir, 18'i (%13,5) iki, 54'ü (% 40,6) üç tanı yöntemi belirtmiş olup 41 pediatrist bu soruyu yanıtlamamıştır. Serbest metin cevaplarının başında MRG +/- MR-anjiyografi (n = 114; %85,7) gelmektedir. Daha az sıklıkla BT +/- BT-anjiyografi (n = 63; %60,1) ve ardından transfontanel ultrason (n = 5; %3,8) olarak belirtilmiştir. Pediatristler tarafından çocukluk çağı inmesinde kullanılan tanı yöntemleri Şekil 2'de gösterilmiştir. Antikoagülan (n= 52, %39,1) en sık önerilen tedavi stratejisi olmuş, bunu sırasıyla trombolitik (n=30, %22,6), antitrombositik (n=15, %11,3) tedavi ve trombektomi (n=8, %6) izlemiştir. Pediatristler tarafından çocukluk çağı inmesinde kullanılan tedavi yöntemleri Şekil 3'de gösterilmiştir. Bu müdahaleler için semptomların başlangıcından çocukluk çağı inmesinin doğrulanmasına kadar geçen ortalama süreye ilişkin ilk 1 saat 5 kez (%3,8), 1-6 saat zaman aralığı 67 kez (%50,4), 7-12 saat zaman aralığı 16 kez (%12), 13-24 saat zaman aralığı 14 kez (%10,5), 25-48 saat zaman aralığı 14 kez (%10,5) olacak şekilde belirtilmiştir. Pediatristlerin inme tanısını doğrulama süreleri Şekil 4'de gösterilmiştir.



Şekil 2. Pediatristler Tarafından Çocukluk Çağı İnmesinde Kullanılan Tanı Yöntemleri

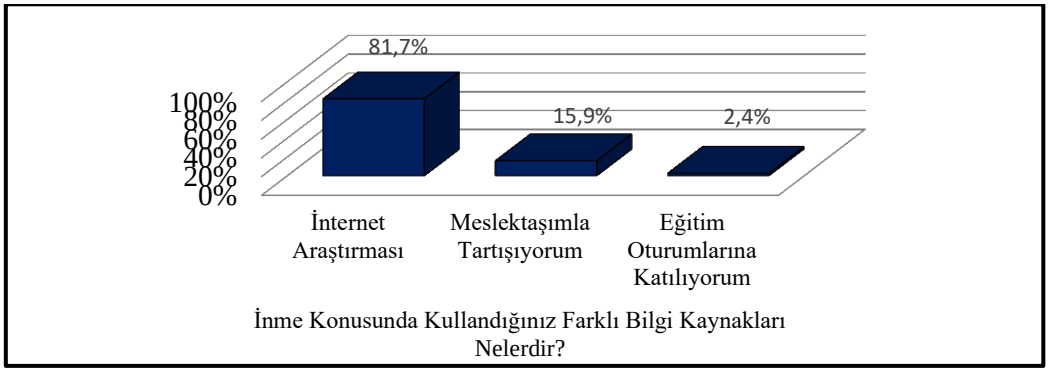


Şekil 3. Pediatristler Tarafından Çocukluk Çağı İnmesinde Kullanılan Tedavi Yöntemleri



Şekil 4. Pediatristlerin İnme Tanısını Doğrulama Süreleri

Daha önce çocukluk çağı inmesine özgü eğitimle ilgili olarak, ileri eğitim oturumlarına katılım 12 (%9) olarak belirtilmiştir. Çocukluk çağı inmesi hakkında daha önce tercih edilen diğer bilgi kaynakları arasında 67 katılımcı (%81,7) internet araştırması yapmakta, 13 katılımcı (%15,9) meslektaşlarıyla tartışmakta, 2 katılımcı (%2,4) eğitim oturumlarına katılmaya tercih etmektedir. Anketlerin 115'inde (%86,5) çocukluk çağı inmesi konusunda kişisel beceri geliştirmeye ilgi duyulduğu belirtilmiştir. Verilen çoktan seçmeli seçenekleri arasında en çok tercih edilen yöntem yüz yüze ileri eğitim oturumlarına katılım olmuştur (n =77, %57,9). İnternet tabanlı eğitim modülleri (n=47, %35,3), dergi yayınları (n=9, %6,8) sırasıyla tercih edilmiştir. Pediatristler tarafından inme hakkında kullanılan bilgi kaynakları Şekil 5'de gösterilmiştir.



Şekil 5. Pediatristler Tarafından İnme Hakkında Kullanılan Bilgi Kaynakları

4. Tartışma

Çocukluk çağı inmesine ilişkin düşük farkındalık, ilgi ve bilgi düzeyinin inmenin erken tanı, tedavi ve takibinin önündeki en büyük engel olduğu ve iyileştirmek için eğitim müdahalelerine duyulan ihtiyaç birçok çalışmada vurgulanmıştır (8,9,10). Genel olarak literatürde e-posta/web tabanlı anketler için düşük geri dönüş oranları bildirilmektedir (11). Hekimlerinin iş yükü göz önüne alındığında, geri dönüş oranının pediatristlerin inmeye yaklaşımı hakkında fikir vermesi açısından tatmin edici bir yanıt düzeyi olduğunu düşünmekteyiz. Mesleki eğitim düzeyi açısından bakıldığında, ankete asistanlar uzman hekimlere oranla daha fazla katılım sağlamıştır. Geri dönüş oranı, özel muayenehane ve hastanelerde çalışan hekimlerde düşüktü (%6,8). Üniversite ve eğitim araştırma hastanelerindeki katılım oranı önemli ölçüde daha yüksek saptandı. Bu durum çocukluk çağı inme şüphesi olan çocuklarla karşılaşma olasılığının doktor muayenehanesine göre daha yüksek olduğunu yansıtıyor olabilir. Ankete katılan hekimler çocukluk çağı inmesini günlük rutinlerinde nadir olarak ayırıcı tanı olarak değerlendirmekte ve bakım sağlamaktadır. Sonuçlarımız, çocukluk çağı inme farkındalığının önemini desteklemektedir. Genel olarak, bu anket çocukluk çağı inmesiyle ilgili semptom, ayırıcı tanı ve tanıyı doğrulamak için uygun tanı adımları ve tedavi seçeneklerini içeren mesleki bilgi ve farkındalıkları ortaya koyan önemli serbest metin sorularını içermektedir (12). Hemiparezi ve konuşma bozukluğu literatüre uygun şekilde önemli semptomlar olarak kabul edilmiştir (13). Çocukluk çağı inmesi hakkında 2015-2017 yılları arasında Gerstl L ve ark. tarafından Almanya'da yapılan bir çalışmada hemiparezi, konuşma ve dil işlev bozuklukları en sık görülen klinik tablo olarak değerlendirilmiştir (14). Mallick A ve ark. tarafından yapılan bir çalışmada hemiparezi en sık görülen bulguydu (15). Öte yandan, çocukluk çağı inmesinin bir semptomu olarak nöbet, bilinç bozukluğu anketimizde vurgulanma eğilimindedir. Ankete verilen yanıtların genel bir yetişkin inme bilgisine mi yoksa çocukluk inmesine ilişkin yaklaşımdan çok genel pediatrik bilgi ve deneyime mi dayandığını ayırt edemiyoruz. Pediatrik hastalarda inme tanı ve tedavisi, özellikle küçük çocuklarda, belirsiz klinik semptomlar nedeniyle sıklıkla gecikir (16). Mackay MT ve ark. tarafından yapılan bir çalışmada acil serviste en sık görülen inme taklitçileri migren, nöbetler ve bell paralizisi olarak saptanmıştır (17). Çalışmamızda çocukluk çağı merkezi sinir sistemi enfeksiyonları en sık inmeyi taklit eden klinik tablo olarak bulunmuştur. Çocukluk çağı inmesinin kliniğine benzeyen bell paralizisi, postiktal parezi ve somatoform bozukluklar belirtilmemiştir (18, 19). Çocukluk çağı inmesini doğrulamak için kullanılan uygun tanısal yöntemler arasından MR-MR anjiyografi katılımcıların büyük çoğunluğu tarafından belirtilmiştir. Bununla birlikte, BT'de sıklıkla kullanılmaktadır. Avustralya'da prospektif olarak yapılan tek merkezli bir çalışmada BT ve MR en sık kullanılan tanı yöntemleriydi (20). Bu sonuç yine yetişkin inme yaklaşımını yansıtıyor olabilir. Erken evrede BT çekimi akut başlangıçlı fokal semptomlarla başvuran yetişkinlerde inme olasılığının çok daha yüksek olması nedeniyle tromboliz için kontrendikasyon oluşturan kanamayı dışlamaya yardımcı olur (21). Akut terapötik önlemlerle ilgili olarak, katılımcıların %39,1'i antikoagülan tedaviyi ilk seçenek olarak görmektedir. Tromboliz en sık ikinci tedavi seçeneği seçenek olarak belirtilmiştir. Literatür taramasında, çocukluk çağı inmesi tedavisinde antikoagülan veya antitrombositik tedavisinin kullanımını tanımlayan sistematik bir inceleme, kohort çalışması ve bir vaka serisi yer almaktadır (20,22,23). Sınırlı veri olmasına rağmen antikoagülan ve antitrombositik tedavinin güvenli olduğu düşünülmüştür. Yetişkinlik döneminin aksine, pediatrik inme hastaları tromboliz için daha az uygundur, ancak akut inme geçiren çocukların çoğunda antikoagülasyon endikedir ve her durumda nöroprotektif önlemler alınmalıdır. İnme geçiren çocukların spesifik tedavisinin, bu alanda deneyimli, uzmanlaşmış, multidisipliner bir merkezde gerçekleştirilmesi gerekir (24). İnme anımsatıcısı FAST, ankete katılan pediatristlerin çoğunluğu tarafından bilinmemekte veya doğru bir şekilde açıklanamamaktadır. Yetişkinlerde tanıyı kolaylaştırma amacıyla kullanılır (25). FAST uygulanabilirliği nedeniyle çocuklardaki kullanımı yeterince güvenli değildir. Yetişkin inmesi üzerine, "denge" için B ve "gözler" için E öneklerini içeren yeni BE FAST anımsatıcısı kullanılmaya başlanmıştır. Yapılan bir çalışma BE FAST'ın yetişkin akut iskemik inmeyi saptamada FAST'tan daha duyarlı olduğunu ortaya koymuştur (26). BE FAST'i çocukluk çağı inme ve inme kliniğine benzeyen hastalıklar üzerindeki yüksek ayırt edici gücü düşünüldüğünde, öğrenmeye teşvik etmek umut verici görünmektedir, çünkü bu kısaltma sadece inmenin ana semptomlarını değil, aynı zamanda derhal harekete geçme çağrısını da içermektedir (17). Katılımcıların %91'i çocukluk çağı inmesi konusunda daha önce herhangi bir eğitim oturumuna katılmamıştır. Mesleki becerilerin geliştirilmesi amacıyla yapılacak eğitim oturumları ve toplantılara katılmak istediklerini belirtmişlerdir.

Akut inmenin pediatrik bir hastada ayırıcı tanı olarak düşünülmesi, sınırlı farkındalık ve bilgi nedeniyle engel oluşturabilir. Bu anket sonuçları eğitim derslerinin yanı sıra, uygulamalı modüllerle de becerilerin geliştirilmesini gerektirmektedir (27). Çocukluk çağı inmesi gibi nadir görülen ancak klinik olarak etkili bir olayla ilgili farkındalığın sürekli olarak artırılması önemlidir. İnternet tabanlı yapılan araştırmaları tercih eden hekim grupları için konuyla ilgili genel ve ileri düzeyde bilgi sunmak üzere tasarlanmış bir web sitesi etkili bir yaklaşım olabilir. Yetişkin inme farkındalığına yönelik sosyal medya çalışmaları, inmenin daha erken tanınmasına ve inme ile ilgili sağlık bakım maliyetlerinin azalmasına yol açmıştır (28). Bu anketin kendisininde çocuk hekimleri arasında konuya ilişkin farkındalığı artırabileceğini düşünmekteyiz. Akut çocukluk çağı inmesi hakkında başarılı, genişletilmiş bir kampanya temel farkındalık mesajını vurgulayabilir. İnmenin etkin tedavisi için erken doğru teşhis gerekir. Çalışmamızın bazı kısıtlamaları bulunmaktadır. Konuyla ilgili eş zamanlı sorgulama, araştırma yapma imkanı sunmaktadır. Katılımcıların 46'sı (%34,6) tarafından serbest metin cevaplarda inmenin dört semptomu sıralanamamıştır. Soruları yanıtlamakta güçlük çekilmesi ya da konuyla ilgili bilgi azlığı buna neden olmuş olabilir. Konuya özel ilgi duyan ya da yakın zamanda çocukluk çağı inmesi geçirmiş bir hastayla karşılaşmış olan hekimlerin anketi doldurma olasılığı daha yüksek olabilir. Bu nedenle, bulgularımız farkındalığı, ilgi ve bilgi düzeyini tam olarak yansıtmayabilir. Bu çalışma sırasında elde edilen deneyime dayanarak, sonraki çalışmaların bulgularının anlamlılığını daha da artırmak için farklı anketler geliştirilmelidir.

5. Sonuç

Çocukluk çağı inmesi, yaşamsal öneme sahiptir. Hastaların etkilenim derecesine göre çeşitli nörolojik semptom ve/veya bulgu ile başvurabileceklerini, inmede çoğunlukla beklenen ani gelişen motor defisit dışında konuşma bozukluğu gibi bulguların inme şüphesi ile en hızlı şekilde değerlendirilerek tetkik ve tedavi edilmesi prognoz açısından oldukça önemlidir. Akut inme gibi zaman açısından kritik bir olay göz önüne alındığında, farkındalığı ve bilgiyi artırmak için yaklaşım, acil tanı ve tedavi sürecini kapsayan derslerden oluşan eğitim programlarının düzenlenmesi gerekli ve önemlidir. Düzenli yayınlar ve konuyla ilgili ayrıntılı bir web sitesi aracılığıyla daha da geniş bir hekim kitlesine ulaşılabilir. Ayrıca, BE FAST anımsatıcısı temel mesaj olarak akılda kalmalıdır. Farkındalığın, bilgi ve ilgi düzeyinin artması inme geçiren çocukların bakımının en iyi şartlarda olmasına katkıda bulunacaktır.

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Sentrotemporal Diken Dalgalı Selim Epilepsi Hastalarının Demografik ve Elektroklinik Özelliklerinin Değerlendirilmesi

Evaluation of Demographic and Electroclinical Characteristics of Patients with Epilepsy with Centrotemporal Spikes

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Abstract: Self-limited epilepsy with centrotemporal spikes (SeLECTS), one of the most common epilepsy syndromes in childhood, is characterized by distinct electroencephalographic (EEG) findings and a high probability of spontaneous remission. This study aimed to evaluate the demographic, clinical, and EEG features of SeLECTS patients followed for at least two years at the Erciyes University Faculty of Medicine Department of Child Neurology and to compare the findings with the literature. A total of 102 patients, previously diagnosed with "Rolandic epilepsy", were included. The male-to-female ratio was 1.2, and the mean age at diagnosis was 10.1±2.8 years. Most patients (86.3%) experienced their first seizure during sleep. Focal seizures occurred in 89.2% of patients, while 10.8% had generalized tonic-clonic seizures. The most common focal seizures symptoms were oropharyngolaryngeal (51.6%) and unilateral facial sensorimotor (34.1%). EEG revealed sharp waves in the centrotemporal region in 56.9% of cases. Carbamazepine, levetiracetam, and valproic acid were the most frequently used treatments, with combination therapy initiated when monotherapy was insufficient. Although SeLECTS is associated with a favorable prognosis, psychiatric comorbidities such as attention deficit, anxiety, and depression were detected in 18.6% of patients based on medical records. While seizure frequency and EEG findings improved during follow-up, these assessments are subjective and should not be regarded as objective outcomes. This study demonstrated that the demographic, electroclinical features, and treatment responses of SeLECTS patients were consistent with the literature, emphasizing the importance of regular follow-up for psychiatric comorbidities
Keywords: Centrotemporal Spikes, Epilepsy, Rolandic, SeLECTS

Özet: Çocukluk çağında en yaygın görülen epilepsi sendromlarından biri olan 'Sentrotemporal diken dalgalı kendini sınırlayan epilepsi (Self-limited epilepsy with centrotemporal spikes:SeLECTS)', belirgin EEG bulguları ve kendiliğinden remisyon olasılığının yüksek olması ile karakterizedir. Bu çalışmada, Erciyes Üniversitesi Tıp Fakültesi Çocuk Nörolojisi polikliniğinde SeLECTS tanısı ile en az iki yıl süreyle takip edilen hastaların demografik, klinik ve EEG bulgularının incelenmesi ve elde edilen sonuçların literatür ile karşılaştırılması amaçlandı. Geçmişte "Rolandik epilepsi" olarak bilinen bu hastalığa sahip toplam 102 hasta çalışmaya dahil edildi. Hastaların erkek/kız oranı 1,2 olup, tanı aldıkları yaş ortalaması 10,1±2,8 yaş idi. Olguların büyük çoğunluğu (n=88, %86,3) ilk nöbetlerini uykuda geçirdi. Hastaların %89,2'si fokal nöbet geçirirken, %10,8'i jeneralize tonik-klonik nöbet geçirdi. Fokal nöbetler arasında en sık görülen semptomlar orofaringolaringeal belirtiler (%51,6) ve unilateral fasiyal sensörimotor semptomlardı (%34,1). EEG kayıtlarının %56,9'unda temporosantral bölgede keskin dalgalar izlendi. Hastalara karbamazepin, levetirasetam ve valproik asit tedavileri başlandı; monoterapiye yanıtın yetersiz kaldığı durumlarda kombine tedavi uygulandı. Her ne kadar SeLECTS iyi prognozlu bir epilepsi sendromu olarak kabul edilse de, hastalarımızın %18,6'sında dikkat eksikliği, anksiyete bozukluğu ve depresyon gibi psikiyatrik komorbiditeler hasta dosyalarındaki kayıtlar temel alınarak saptandı. Klinik izlem sürecinde, nöbet sıklığındaki azalma ve EEG kayıtlarındaki düzelmelere paralel olarak bu komorbiditelere ait bulgularda azalma gözlemlenmiş olsa da, sözkonusu değerlendirmelerin subjektif verilere dayandığı ve bu nedenle objektif bir sonuç olarak yorumlanmaması gerektiği göz önünde bulundurulmalıdır. Bu çalışma, SeLECTS tanılı olguların demografik ve elektroklinik özellikleri, tedaviye verdikleri yanıtlar ve genel prognozlarının literatürle büyük ölçüde uyumlu olduğunu ortaya koymuş; bununla birlikte psikiyatrik komorbiditelerin varlığı açısından hastaların düzenli takibinin gerekliliği vurgulanmıştır.
Anahtar Kelimeler: Epilepsi, Rolandik, Sentrotemporal dikenli, SeLECTS

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1. Giriş

Epileptik nöbetler, genellikle çocuklarda ve ergenlerde görülmektedir ve çocuk nöroloji polikliniğine yapılan en sık başvuru nedenlerinden birisidir. Nöbetin doğru tanımlanması ve sınıflandırılması, prognozu değerlendirmek ve en uygun tedaviyi seçmek için büyük önem taşımaktadır (1). Epileptik sendrom ise, benzer klinik semiyolojiye sahip olan, başlangıç yaşı, karakteristik elektroensefalografik (EEG) bulguları ve prognozları ile tekrarlayan, provoke edilmemiş nöbetlerle karakterize olan durumları tanımlamaktadır. Çocukluk çağında epilepsi sendromları sık görülmekte olup, en yaygın olanlardan biri 'Sentrotemporal diken dalgalı kendini sınırlayan epilepsi (Self-limited epilepsy with centrotemporal spikes: SeLECTS)'dir (2). Geçmişte Rolandik epilepsi (RE) veya 'iyi huylu sentrotemporal dikenli çocukluk epilepsisi' olarak adlandırılan SeLECTS, iyi huylu fokal epilepsi sendromu olarak bilinmektedir (3). Genellikle okul çağındaki çocuklarda görülmektedir ve kendiliğinden remisyon olasılığının yüksek olmasıyla karakterizedir (4). SeLECTS'in yıllık insidansı 100000'de 7,1-21 arasında değişmekte olup, erkeklerde kızlara göre daha fazla görülmektedir (5). Prognoz iyi seyirli olsa bile, hastaların %15-30'unda nörogelişimsel bozukluklar bildirilmiştir (6).

Bu çalışma ile polikliniğimizde SeLECTS tanısı alan ve düzenli aralıklarla takip edilen hastaların demografik, klinik ve EEG bulgularının özetlenmesi, uygulanan tedavilerin etkinliği, etki süreleri, karşılaşılan yan etkiler ile bu hastalığa eşlik eden durumların belirlenmesi ve güncel literatürler ile karşılaştırılması amaçlanmıştır.

2. Gereç ve Yöntemler

Bu çalışma ile Erciyes Üniversitesi Tıp Fakültesi Çocuk Nörolojisi bölümünde 2010-2020 tarihleri arasında 'SeLECTs tanısıyla en az iki yıl takip edilen olgular retrospektif olarak incelendi. Olguların demografik özellikleri, nöbet tipleri, sıklığı, süresi ve uyku-uyanıklık ile ilişkisi, özgeçmişlerinde febril konvülziyon (FK) öyküsü, soy geçmişlerinde epilepsi öyküsü, EEG ve nörogörüntüleme bulguları, başlanan antinöbet ilaçlar (ANİ), ilaçların yan etkileri, prognozları ve takip süreleri hastane kayıtlarından elde edildi. Erciyes Üniversitesi Tıp Fakültesi Klinik Araştırmalar Etik Kurulu tarafından onaylandı. (Sayı No: 2023/507, Tarih: 09/08/2023).

3. Bulgular

Çalışmada 'SeLECTS' tanısı konulan 165 hasta tespit edildi. Kayıtlar incelendiğinde, hastaların 24'ünün başka bir merkezde tanı alması, 17'sinin poliklinik kontrollerine düzenli gelmemesi, 12'sinin EEG verilerin ve 10'unun dosya verilerinin eksik olması nedeniyle çalışmaya dahil edilmedi. Çalışmaya dahil edilme sürecine ilişkin detaylı akış şeması Şekil 1'de sunulmuştur. Düzenli aralıklarla, en az iki yıl çocuk nörolojisi poliklinik takiplerine devam eden 102 hasta çalışmaya alındı. Hastaların 56 (%54,9)'sı erkek, 46 (%45,1)'sı kız idi. Erkek/kız oranı 1,2 olarak saptandı. Olgularımızın tanı aldıkları yaş ortalaması 10,1±2,8 yaş (min:3,5 ve maks:15,5) olup, ilk defa nöbet geçirdiklerinde yaş ortalaması 9,5±2,9 yaş idi. İlk nöbet geçirdikleri yaşlara göre hasta dağılımı şöyleydi: 5-7 yaş arasında 12 (%11,7), 7-9 yaş arasında 28 (%27,5), 9-12 yaş arasında 32 (%31,4) hasta, 5 yaş ve altında 10 (%9,8), 12 yaş ve üzerinde 20 (%19,6). Hastalarımızın son poliklinik kontrollerinde ise yaşları 13,2±2,8 (min:5,5 ve maks:18) arasında değişmekte idi.

Hastaların %15,7 (n=16)'sinde febril nöbet, %11,8 (n=12)'inin ailede epilepsi öyküsü mevcuttu. Hastaların %17,6 (n=18)'sında anne-baba arasında akrabalık tespit edildi.

Hastaların 19'unda (%18,6), çocuk ve ergen ruh sağlığı hastalıkları bölümü tarafından takip edilmesi gereken psikiyatrik komorbiditeler saptandı. Bunlar arasında en fazla dikkat eksikliği-hiperaktivite bozukluğu (DEHB), anksiyete bozukluğu ve depresyon gibi durumlar tespit edildi. Veriler Tablo 1 ve Tablo 2'de sunulmuştur.

SeLECTS ile takipli hastaların çoğu (n=88, %86,3) ilk nöbetlerini uykudayken, %27,3'ü ise uyanıkken geçirdi. Hastaların %89,2'si fokal nöbet geçirirken, %10,8'i jeneralize tonik klonik nöbet geçirdi. Fokal nöbetler arasında en sık görülen semptom orofaringolaringeal semptom (n=47, %51,6) ve unilateral fasiyal sensörimotor semptom (n=31, %34,1) iken, bunu hipersalivasyon (n=9, %9,9) ve konuşmada duraklama (n=4, %4,4) semptomları izledi.

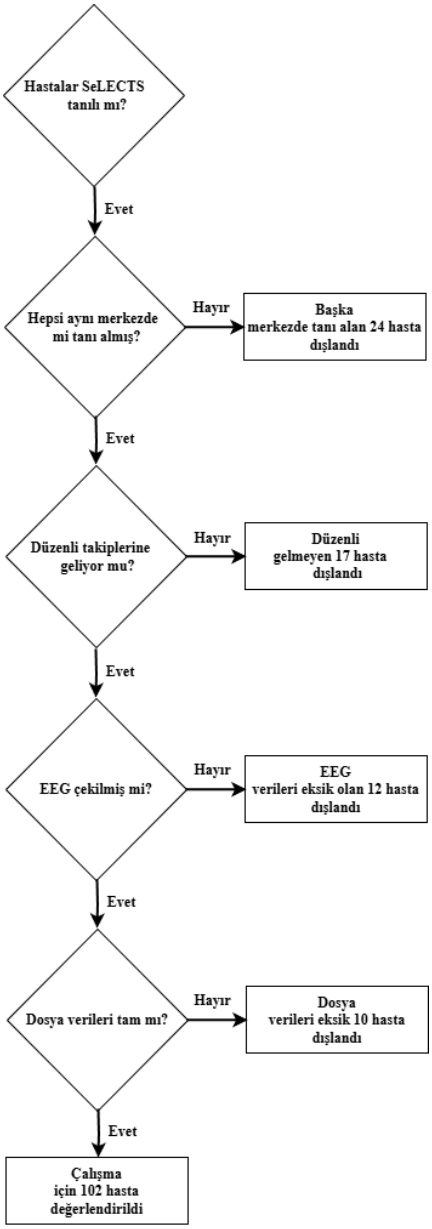
Çalışmaya katılan tüm hastaların uyku ve uyanıklık EEG'leri değerlendirildi. Hemen hemen hepsinin ilk nöbet sonrası beş-yedi gün içinde çekilen EEG'de 58 (%56,9) hastada temporosantral bölgede keskin

dalgalar izlenirken, 44 hastanın (%43,1) EEG'sinde herhangi bir epileptiform aktivite izlenmedi.

Hastaların nörogörüntüleme bulguları değerlendirildiğinde ise %77,4 hastanın beyin MRG görüntülerinde herhangi bir patoloji izlenmezken, %10,8'inde patolojik bulgular, %11,8'inde non-spesifik bulgular görüldü. Tablo 3'te nöbetlerin özellikleri ve görüntüleme bulguları verilmiştir.

Hastalar tanı aldıktan sonra, en az iki yıl süreyle düzenli olarak takip edildi. İki yıl boyunca, hastaların %27,5'i sadece bir kere nöbet geçirirken, %28,4'ü iki kere, %18,6'sı üç kere, %13,7'ü dört kere ve geriye kalan %11,8'i ise beşten fazla nöbet geçirdi. Tablo 3'de veriler bildirilmiştir.

Çekilen ilk EEG'de izlenen %56,9 epileptiform anomalilerinin, %45,1'inde fokal bulgular, %8,9'unda multifokal bulgular, %2,9'unda jeneralize bulgular saptandı. Hastalara iki yıl takipleri boyunca en az dört defa EEG çekildi. İlk çekilen EEG bulgularındaki fokal bulguların, iki yılın sonunda %6,8'e kadar, multifokal bulguların %3,9'a kadar, jeneralize bulguların %1,9'a kadar gerilediği; normal EEG bulgularının ise %83,3'e kadar yükseldiği görüldü. Tablo 4'de hastaların EEG bulguları verilmiştir.



Şekil 1. Çalışma hastaları akış şeması

Tablo 1. SeLECTS Tanısıyla Takip edilen Hastaların Yaşa Bağlı Verileri

	Ortalama	Minimum-Maksimum
İlk nöbet yaşı	114,5±35,4 ay	42-182 ay
	9,5±2,9 yaş	3,5-15 yaş
Tanı konulduğu yaş	122,1±34,3 ay	44-185 ay
	10,1±2,8 yaş	3,5-15,5 yaş
Mevcut yaş	158,6±33,9 ay	68-215 ay
	13,2±2,8 yaş	5,5-18 yaş

Tablo 2. SeLECTS Tanılı Hastaların Demografik ve Klinik Özellikleri

		Sayı (n)	Yüzde (%)
Cinsiyet	Kız	46	%45,1
	Erkek	56	%54,9
İlk nöbet geçirme yaşı	<5 yaş	10	%9,8
	5-7 yaş	12	%11,7
	7-9 yaş	28	%27,5
	9-12 yaş	32	%31,4
	>12 yaş	20	%19,6
Ailede epilepsi öyküsü var mı?	Evet	12	%11,8
	Hayır	90	%88,2
Akrabalık var mı?	Evet	18	%17,6
	Hayır	84	%82,4
Febril nöbet geçirmiş mi?	Evet	16	%15,7
	Hayır	86	%84,3
Psikiyatrik hastalık eşlik ediyor mu?	Evet	19	%18,6
	Dikkat eksikliği hiperaktivite bozukluğu	7	%36,8
	Anksiyete bozukluğu	6	%31,6
	Depresyon	4	%21,1
	Özgül öğrenme güçlüğü	2	%10,5
	Hayır	83	%81,4

Hastaların 8'i (%7,8) hariç, hemen hemen hepsine (%92,2) antinöbet ilaç tedavisi başlandı. Tedavi başlanan 94 olgunun sırasıyla 33'üne (%35,1) karbamazepin; 18'ine (%19,1) levetirasetam;14'üne (%13,8) valproik asit tedavisi başlandı. İlaç başlandıktan sonra 14 hastada (%14,8) görülen yan etkiler nedeniyle ilaç değişiklikleri yapıldı. En sık görülen yan etkileri sinirlilik, deri döküntüsü, kilo alımı ve iştahsızlıktı. Monoterapiden fayda görmeyen 29 (%28,4) hastaya ortalama 7,8 ±6,7 ay (min:1 ay, maks:30 ay) sonra kombine tedavi verildi. Hastaların %18,6'sı ikili tedavi alırken, %9,8'inin ikiden fazla ilaç ihtiyacı oldu. Tedaviye başlanan hastaların %83,3 (n=85)'ünde tedaviye tam cevap alındı. Tablo 5'te tedavi uygulanan hastalar bildirilmiştir.

Tablo 3. Nöbetlerin Özellikleri ve Görüntüleme Bulguları

		Sayı (n)	Yüzde (%)
Gerçekleştiği zaman	Uykuda	88	%86,3
	Fokal	85	%96,6
	Jeneralize	3	%3,4
	Uyanıkken	14	%27,5
	Fokal	6	%42,9
	Jeneralize	8	%57,1
Nöbet tipleri	Fokal nöbet	91	%89,2
	Orofaringolaringeal semptom	47	%51,6
	Unilateral fasiyal sensörimotor semptom	31	%34,1
	Hipersalivasyon	9	%9,9
	Konuşmada duraksama	4	%4,4
	Jeneralize tonik-klonik nöbet	11	%10,8
EEG bulguları	Epileptik	58	%56,9
	Normal	44	%43,1

Nöbet sayısı	Bir nöbet	28	%27,5
	İki nöbet	29	%28,4
	Üç nöbet	19	%18,6
	Dört ve fazla sayıda nöbet	26	%25,5
MR bulguları	Normal	79	%77,4
	Anormal	11	%10,8
	Araknoid kist	5	%45,4
	Benign lateral ventrikül genişlemesi	3	%27,3
	Chiari malformasyonu	2	%18,2
	Hafif korpus kallozum hipoplazisi	1	%9,1
	Non-spesifik	12	%11,8

Tablo 4. Hastaların EEG Bulguları

EEG Bulguları	İlk n (%)	6. ay n (%)	1. yıl n (%)	2.yıl n (%)
Fokal bulgular	46 (%45,1)	41(%40,2)	16 (%15,7)	7 (%6,8)
Multifokal bulgular	9 (%8,9)	7 (%6,9)	5 (%4,9)	4 (%3,9)
Jeneralize bulgular	3 (%2,9)	2 (%1,9)	2 (%1,9)	2 (%1,9)
Normal	44 (%43,1)	52 (%51)	79 (%77,5)	85 (%83,3)

Tablo 5. Tedavi uygulanan hastalar

Tedavi	Sayı	Yüzde	Yan etki görülen hasta sayısı	En sık görülen yan etkiler
Levetirasetam (Lev)	18	%17,6	6/18	Sinirlilik
Karbamazepin (KBZ)	33	%32,4	5/33	Baş ağrısı, kilo kaybı
Valproik asit (VPA)	14	%13,7	3/14	Kilo alımı
Lev+KBZ	9	%8,8	5/9	Baş ağrısı, sinirlilik
Lev+VPA	5	%4,9	2/5	Sinirlilik
KBZ+VPA	5	%4,9	3/5	Deri döküntüsü
Lev+KBZ+VPA	10	%9,8	5/10	Baş ağrısı, yorgunluk
Tedavisiz klinik izlem	8	%7,9		

Lev: Levetirasetam *KBZ*: Karbamazepin *VPA*: Valproik asit

4. Tartışma

Çocukluk çağı epilepsilerinin yaklaşık %5 ile 25'ini oluşturan SeLECTs, genellikle yaşamın ilk dekatında başlayıp, ergenlik döneminde son bulan ve çocuklarda en sık görülen epilepsi sendromlarından birisidir (7). Bu çalışmada da benzer şekilde nöbetlerin başlangıç yaşı 3,5 ile 15 yaş (ortalama: 9,5±2,9 yaş) arasında değişmekte olup, tanı yaşı ortalaması 10,1±2,8 yaş (min:3,5 ve maks:15,5) olarak hesaplanmıştır. Literatüre benzer şekilde hastalar arasında erkek/kız oranında istatistiksel olarak anlamlı bir fark bulunmasa da olguların çoğunu erkek hastalar oluşturmaktadır (p>0,005). (2,5)

SeLECTS'te nöbetler genellikle fokal başlangıçlı olup, hemifasiyal sensörimotor nöbetler şeklinde görülmektedir. Yüzün bir tarafında görülen orofasial motor bulgulara tek taraflı dil, dudak, damak ve yanakta uyuşma ve karıncalanmanın görüldüğü elektriklenme benzeri duysal semptomlar eşlik etmektedir (2, 8). Ağız kenarında ipsilateral tonik deviasyon, sonrasında en fazla bir dakika süren klonik kasılmalar görülebilir. Bu kasılmalar sonucunda, nöbette başlayan hırıltılı konuşma ve postiktal dönemde de devam eden konuşmada duraklamalar görülebilir. Konuşmaları dizartrik olan bu hastalar, mimiklerle iletişim kurmaya çalışmaktadır. Olguların üçte birinde ise hipersalivasyon görülmektedir (9). Hemifasiyal nöbet şeklinde başlayan ataklar, bazen kola ve ayağa yayılabilir. Genellikle bilinç korunmakta olup, olguların %5-10'unda nadiren sekonder jeneralizasyon görülebilmektedir. Bizim çalışmamızda da hastaların %51,6'sında orofaringolaringeal semptomlar, %34,1'inde tek taraflı fasiyal sensörimotor semptomlar görülmüştür. Hastaların %9,9'unda hipersalivasyon, %4,4'ünde konuşmada duraklama izlenirken, literatüre benzer şekilde %10,8'inde jeneralize nöbetler izlenmiştir. Literatürde, bazı durumlarda nöbetlerin birkaç hafta aralıklarla, çok sık tekrarlayabildiği ve uzamış nöbetlerde nadiren Todd paralizisi (postiktal parezi)

görülebildiği bildirilmiştir (8). Bizim çalışmamızda ise sadece iki hastada Todd paralizisi görülmüştür.

Yapılan çalışmalarda bazı hastaların, SeLECTS tanısı almadan önce %15-20 oranında febril nöbet geçirdiği belirtilmiştir. Bizim hastalarımızın %15,7 (n=16)'sinde febril nöbet geçirme öyküsü olup, %11,8 (n=12)'inin ailesinde de epilepsi öyküsü mevcuttu.

SeLECTS'te nöbetler genellikle 2-3 dakika arasında seyretmektedir. Bizim çalışmamızda dosyalar incelendiğinde, nöbet sürelerinin beş dakikadan kısa olduğu belirtilmektedir.

SeLECTS'te nöbetler genellikle beyin merkezindeki rolandik fissür etrafında bulunan sentrotemporal alandan kaynaklanmaktadır. Çekilen EEG'de sentrotemporal diken dalgalar, uykuda ve uyanıklıkta görülebilen, normal zemin ritm aktivitesi üzerindeki difazik keskin/keskin yavaş dalga bulgusudur (10). İnteriktal EEG'de bile görülebilen bu dalgalar, hiperventilasyondan, göz açıp kapamadan ve intermittan fotik stimülasyondan etkilenmez. Epileptiform aktivite ne kadar yoğun olursa olsun, SeLECTS'li hastalarda nöbet sıklığı düşük seyretmektedir. Hastaların dörtte biri tek nöbet geçirmekte, %50'si ise beş nöbetten daha az nöbet geçirmektedir. Literatüre benzer şekilde, bizim çalışmamızda da hastaların 28'i (%27,5) tek nöbet geçirirken, 29'u (%28,4) iki kere, 19'u (%18,6) üç kere, 14'ü (%13,7) dört kere ve geriye kalan 12'si (%11,8) ise beşten fazla nöbet geçirmiştir.

SeLECTS'te nöbetler genellikle uyku sırasında, non-REM (rapid eye movement) evresinde veya uykuya daldıktan kısa süre sonra, ya da sabah uyanmaya yakın saatlerde görülmektedir (9). Çocukların üçte birinde gündüz geçirilen nöbetler de görülebilmektedir. Bizim çalışmamızda da hastaların %13,7 (n=14)'sinde gündüz nöbeti tespit edilmiştir.

SeLECTS iyi prognozlu, genellikle ikinci dekatta nöbetlerin tamamen kaybolduğu bir epilepsi türüdür. Buna dayanarak hastalar antinöbet ilaç verilmeden de izlenebilmektedir (11). Bizim çalışmamızda sekiz olguya (%7,8) aile ile detaylı bilgilendirmeler yapılarak tedavi başlanmamıştır. Tedavisiz takip edilen olgulardan sadece biri toplam iki nöbet geçirmiştir.

SeLECTS'te sıklıkla monoterapide karbamazepin, levetirasetam ya da valproik asit gibi birinci basamak antinöbet ilaçlar (ANİ) başlanmaktadır (11). Okskarbazepin, fenitoin, klobazam, primidon ve sültiam da tedavide etkili olabilecek diğer antinöbet ilaçlardır (9). Bizim çalışmamızda olgularımızın en çok (%35,1) karbamazepin aldığı; diğer olgularımızın %19,1 (n=18)'ine levetirasetam başlandığı, %13,8 (n=14)'ine valproik asit başlandığı görülmüştür. İlaç başlandıktan sonra hastaların %14,8'inde yan etkiler görülünce ilaç değişiklikleri yapıldı. En sık görülen yan etkileri sinirlilik, deri döküntüsü, kilo alımı ve iştahsızlık oluşturuyordu. Başka birinci basamak ANİ ile tedaviye devam edildi. Monoterapiden fayda görmeyen hastaların %28,4'üne ikili ya da üçlü ilaçlardan oluşan kombine tedavi verildi. Hastalar arasında başka ANİ ihtiyacı olan hastaya rastlanılmadı. Takip edilen hastalarımızın hiçbirinde uykuda status epileptikus ensefalopati (ESES) veya Landau-Kleffner sendromu görülmedi.

SeLECTS'te kranial görüntülemelerin genellikle normal olduğu belirtilmiştir. Çalışmamızda olguların %77,4'ünde patoloji saptanmamıştır, %10,8 olguda cerrahi endikasyonu olmayan anomali; %11,8 olguda non-spesifik bulgular saptanmıştır. Patolojik bulgular arasında en fazla araknoid kist görülürken, sırasıyla benign lateral ventrikül genişlemesi, Chiari malformasyonu-tip 1 ve hafif korpus kallozum hipoplazisi görülmüştür.

Hastaların nöbet geçirdikleri dönemler haricinde genellikle nörolojik muayeneleri ve nörolojik gelişimleri normaldir. Ancak hastaların özellikle gece nöbet geçirmesi, çocuğun gelişimini olumsuz yönde etkileyebilmektedir. Dikkat işlevlerinde bozulma, sözel-işitsel hafıza, okuma, heceleme ve görsel-motor koordinasyon gibi kognitif fonksiyonlarda gerileme görülebilir (9,12). Bizim çalışmamızda da hastaların %18,6 (n=19)'sının çocuk ruh sağlığı polikliniklerinde takip edilmekte olduğu görülmüştür. Olgular arasında en fazla (%36,8, n=7) DEHB bulunurken, altı olgunun (%31,6) anksiyete bozukluğu, dört olgunun (%21,1) depresyon ve iki olgunun (%10,5) özgül öğrenme güçlüğü ile takipleri yapılmıştır. Bütün bu hastaların çekilen EEG'lerinde epileptik aktiviteler izlenirken, iki yıllık takip sonrasında, hastaların EEG'lerinde düzelmeler, nöbet sayılarında azalma ve tedaviye olumlu yanıt verdikleri görülmüştür. Dosya kayıtlarından aileleri tarafından nöropsikiyatrik yakınmaların şiddetinde azalmalar olduğu bildirilmiştir.

Çalışmanın Limitasyonları

Küçük bir örneklem büyüklüğüne sahip retrospektif tek merkezli olan bu çalışmamızda, nöropsikiyatrik semptomu olan hasta sayısının az olması nedeniyle, psikiyatrik komorbiditelere ilişkin değerlendirmeler, ölçek temelli olmayıp hasta dosyalarındaki klinik notlara dayanmakta olup, bu durum elde edilen

verilerin objektifliğini sınırlamaktadır. Ayrıca, psikiyatrik komorbiditesi olan hastalara düzenlenen tedavi yaklaşımlarının (örneğin antipsikotikler veya antidepresanlar) nöbet kontrolü üzerine etkileri ya da antinöbet ilaçların psikiyatrik belirtiler üzerine potansiyel etkileri ayrı olarak analiz edilmemiştir.

Literatür dikkatli değerlendirildiğinde, nöbet geçiren hastalarda etiyolojiyi tam belirlemek için genetik çalışılması önerilmiş olsa da bizim çalışmamızda dosya kayıtlarından hastaların hiçbirinin epilepsi genetiğine ulaşılamamıştır. Genel olarak idiyopatik olarak değerlendirilmişlerdir.

5. Sonuç

Bu çalışma ile hastalarımızın yaş, cinsiyet dağılımı, nöbet geçirme yaşları, semptomları, EEG bulguları, almakta olduğu tedaviler ve prognozları değerlendirildiğinde sonuçların büyük ölçüde literatür ile uyumlu olduğu görülmüştür. Her ne kadar iyi prognozlu olarak kabul edilen bir epilepsi sendromu olsa da SeLECTS ile takip edilen hastalarımızda da ek olarak komorbid psikiyatrik bulgulara rastlanılmıştır.

Sonuç olarak, özellikle birinci dekatın sonlarında ya da ikinci dekatın başında nöbet geçiren hastalarımızı değerlendirirken dikkat eksikliği, anksiyete bozuklukları ve depresyon sorunları açısından hastaların daha detaylı değerlendirilmeleri gerektiği ve tedavi seçimine karar verirken hastaların bilişsel fonksiyonlarında gerileme olabileceği göz önüne alınarak kararlar verilmelidir. Hasta güvenliği açısından nöbet tekrar riski, sadece EEG ile değerlendirilemeyeceği için, ilaç başlanması rutin önerilmemekle birlikte, hastaların yakın takip edilmesi gerekmektedir. Eşlik eden psikiyatrik bozuklukları ile olan ilişkiyi açıklığa kavuşturmak için daha geniş vaka serileri içeren prospektif çalışmalar yapılmasına ihtiyaç vardır.

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Milk Fistula Developing From Accessory Breast After Laser Epilation, Case Report

Lazer Epilasyon Sonrasi Aksesuar Memeden Gelişen Süt Fistülü

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Abstract: Milk fistula is a rare condition characterized by the formation of a connection between the skin surface and the milk duct and spontaneous discharge of milk. It is most commonly seen after abscess drainage, biopsy or any interventional procedure. More rarely, spontaneous milk fistulas have also been reported. The occurrence of milk fistulas in the accessory breast is even rarer. In this study, we present a case of milk fistula that developed after laser hair removal in an accessory breast in a breastfeeding woman, which has not been reported in the literature before.
Keywords: fistula, laser, accesory breast

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Özet: Süt fistülü emziren kadınlarda deri yüzeyi ile süt kanalı arasında bir bağlantı oluşması ve buradan kendiliğinden süt boşalmasıyla karakterize nadir görülen bir durumdur. En sık abse drenajı, biyopsi yada girişimsel herhangi bir işlemden sonra görülür. Daha nadiren kendiliğinden gelişen süt fistülleride bildirilmiştir. Süt fistüllerinin aksesuar memede görülmesi ise daha nadir rastlanan bir durumdur. Bu çalışmada daha önce literatürde yayınına rastlanmayan emziren bir kadında aksesuvar memede lazer epilasyon sonrası gelişen bir süt fistülü olgusunu sunduk.

Anahtar Kelimeler: fistül, lazer, aksesuar meme

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1. Introduction

Milk fistulas are a condition known as outflow of milk through the skin as a result of a connection between the skin and milk ducts in lactating women. Although the most common cause is abscess drainage, biopsy or surgical interventions, spontaneous development has also been reported (1.2). Accessory breast tissue may develop because the dorsum of the breast consisting of a portion of the galactic band extending from the axilla to the groin does not fully regress embryologically. The incidence of accessory breast tissue in women is between 2% and 6% in the general population (3,4). The most common location of accessory breast tissue is the axilla (5). Rarely, milk fistulas have been reported to develop in the accessory breast (6).

In this study, we presented a case of milk fistula developing in the axillary accessory breast after laser hair removal, which was not encountered in the literature reviewed.

2. Case Report

The case was a 28-year-old woman with a history of swelling and pain in the right axillary region that started with pregnancy and milk coming from the right armpit for the last 1 month in the postpartum lactational period. Our patient had a history of active breastfeeding for 8 months after delivery. The patient stated that she had undergone axillary laser epilation 2 times in the last 3 months due to hair growth in the axillary region. After the 2nd session of laser hair removal, she stated that milk had been coming from the axillary region for the last 1 month. On physical examination, both breasts were normal and there was a finding compatible with an accessory breast measuring approximately 5 x 4 cm in the right axillary region. It was observed that milk was coming from the skin area on the accessory breast with provocation. Infection parameters were normal in blood tests. Prolactin level was normal. A fluid smear swab was taken from the axillary skin over the milk fistula. Microscopic smear examination revealed nipple discharge. Polymorph nucleated leukocytes and histiocytes were observed in the microscopic smear. On breast ultrasound, both breasts were normal and an accessory breast with a size of 43x35mm was found in the right axilla. Detailed dynamic breast MRI ordered for milk fistula showed right axillary accessory breast tissue. No ductal structure of the accessory breast in the right axillary region was detected on MRI. After evaluation with the results of the examinations, surgical excision of the accessory breast was recomended.However, since the patient was breastfeeding, we recommended surgery after 1 year of lactation. The patient accepted our recommendation and was called to the outpatient clinic for follow-up after 3 months.

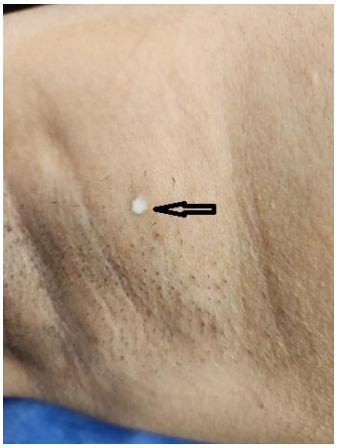

Figure 1. Fistula showen by arrow

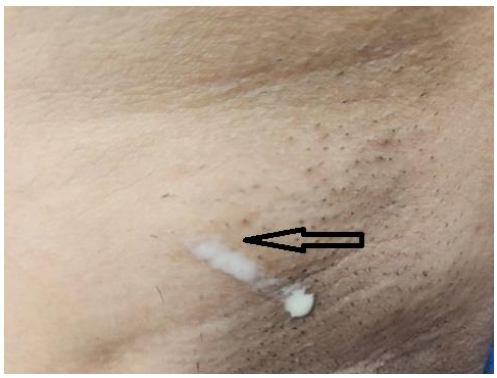

Figure 2. Milk fistula

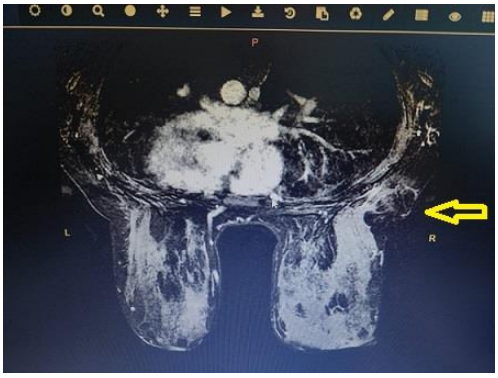

Figure 3. Accesory breast showen by arrow in MR scan.

3. Discussion

Accessory breast is a congenital condition in which abnormal accessory breast tissue is present in addition to normal breast tissue. Although accessory breast tissue is usually found anywhere along the milk line extending to the inguinal region, it is most common in the axillary region. The incidence in women is 2% to 6%. Occurrence rates vary widely by ethnicity and gender, ranging from as low as 0.6% in Caucasian people to as high as 5% in Japanese women. The most common symptoms include swelling and tenderness of the affected area, thickening of the armpit, and restriction of shoulder range of motion. These symptoms usually worsen with the onset of puberty and pregnancy. Surgical excision is usually recommended in cases with accessory breasts in the presence of possible symptoms(8,9).

A few cases of milk fistula developing from an accessory breast were found in the literature. These cases usually developed after fine needle (core) biopsy or spontaneously developed milk fistula cases. We think that this case is the first case of milk fistula developing from the accessory breast after laser epilation.

Trivedi et al. do not recommend permanent laser hair removal during pregnancy due to lack of safety data. They recommended waxing, shaving or using depilatory creams for hair removal during this period.

Gold et al. showed that the use of a laser module that combines three wavelengths (755, 810 and 1064 nm) in a single pulse is safe and effective for hair removal treatment in all skin types. They found a significant reduction in the number of hairs in all skin types. In addition, no side effects and complications were found in any case. In our case, after the second laser (755nm) epilation session, milk came from the skin on the accessory breast and milk fistula formed.We think that the fistula formation was triggered by the laser effect on the skin due to hypertrophy of the accessory

breast because our patient was in the lactational period.We do not recommend axillary laser epilation especially in women with axillary accessory breast in the lactational period. In this regard, we believe that dermatologists should definitely seek the opinion of the general surgeon if they suspect the presence of accessory breast in the axilla examination for women in the lactational period(8).

Laser devices, while having a wide range of applications, can cause serious complications if used incorrectly. Therefore, laser treatments should only be performed by trained professionals. Early detection and management of complications can reduce long-term health issues and the need for additional treatments. Furthermore, safety measures must be diligently followed by the entire team(9).

In addition to the previously discussed risks and complications, it is important to highlight that accessory breast tissue may present challenges in both diagnosis and management. Recent studies indicate that accessory breasts can sometimes harbor malignancies, which underscores the need for careful monitoring and evaluation, especially during periods of hormonal fluctuation such as pregnancy and lactation (10). Furthermore, the influence of external interventions like laser treatments could alter the natural course of accessory breast-related complications, potentially leading to unusual outcomes like milk fistulas, as highlighted in this case (11). Therefore, multidisciplinary consultation remains crucial for optimal patient care in such instances.

4. Conclusion

The accessory breast is especially symptomatic during pregnancy and lactation. Although it presents with clinically insignificant findings, in women with accessory breasts, especially in the lactational period, if axillary laser permanent hair removal is considered, it should be kept in mind that milk fistula may develop from this area. Laser hair removal should be postponed in this period and, if necessary, surgical excision of the accessory breast should be postponed.

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An Evolving and Rare Entity: SMARCB1(INI-1)-Deficient Sinonasal Carcinoma

SMARCB1 (INI-1) Eksikliği olan Sinonazal Karsinom

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Abstract: Malignant tumors of the paranasal sinuses and nasal cavity are rare. These tumors constitute very few of all head and neck tumors. With the developments in the field of molecular biotechnology, significant revisions have been made in The 2022 5th edition of the WHO Classification of the Head and Neck. Tumors with the definition of new entities. SWItch/Sucrose Non-Fermentable (SWI/SNF) complex-deficient carcinomas, which have been included as a separate entity under the general heading of sinonasal undifferentiated carcinomas, consist of two major subtypes caused by the loss of one of the SWI/SNF complex genes; SMARCB1-deficient sinonasal carcinoma and SMARCA4-deficient sinonasal carcinoma. The most common subtype is SMARCB1-deficient sinonasal carcinoma. These tumors have been misdiagnosed as neuroendocrine carcinoma, poorly differentiated carcinoma, sinonasal undifferentiated carcinoma and teratocarcinoma in previous years according to our current knowledge. Histopathologically, uniform cytologic features and appearance mimicking many tumors make it difficult to diagnose especially in small biopsies. Correctly naming this high-grade malignancy within the scope of molecular classification is important for treatment planning. Optimal treatment approaches are also limited. Although there is a consensus on radical resection/surgery followed by adjuvant treatment, the order of treatment may vary between institutions. Agents such as immune checkpoint inhibitors and EZH2 inhibitors are among the new treatment options. In this report, we present a case of SMARCB1-deficient sinonasal carcinoma according to the new molecular classification with recurrence at the age of 20. We aimed to emphasize the importance of histopathological and immunohistochemical findings and to raise awareness of the presence of this entity.
Keywords: Sinonasal carcinoma, SMARCB1, INI-1, SMARCB1 (INI-1) deficient, sinonasal undifferentiated carcinoma

Özet: Paranazal sinüsler ve nazal kavitenin malign tümörleri nadirdir. Tüm baş-boyun tümörlerinin çok azını oluşturur. Moleküler biyoteknoloji alanındaki gelişmeler ile Dünya Sağlık Örgütü Baş ve Boyun Tümörleri 2022 yılı 5.baskısında yeni antitelerin tanımlanması ile önemli değişiklikler yapılmıştır. Sinonazal indiferansiye karsinomlar genel başlığı altında ayrı bir antite olarak yerini alan SWItch/Sucrose Non-Fermentable (SWI/SNF) kompleksi eksikliği olan karsinomlar SWI/SNF kompleks genlerinin birinin kaybı ile oluşan iki majör subtipten oluşmaktadır; SMARCB1-eksikliği olan sinonazal karsinom ve SMARCA4-eksikliği olan sinonazal karsinom. En yaygın subtip SMARCB1- eksikliği olan sinonazal karsinomdur. Bu tümörler önceki yıllarda nöroendokrin karsinom, kötü diferansiye karsinom, sinonazal indiferansiye karsinom, teratokarsinom gibi bugünkü bilgilerimize göre yanlış tanılar almıştır. Histopatolojik olarak uniform sitolojik özellikler ve birçok tümörü taklit eden görünüm özellikle küçük biyopsilerde tanı koymayı güçleştirmektedir. Yüksek dereceli olan bu maligniteyi moleküler sınıflama kapsamında doğru olarak isimlendirmek tedavi planlaması açısından önemlidir. Optimal tedavi yaklaşımları da sınırlıdır. Radikal rezeksiyon/cerrahi ve sonrasında adjuvan tedavi konusunda fikirbirliği olsa da tedavinin sırası kurumlar arasında değişebilmektedir. İmmun kontrol noktası inhibitörleri ve EZH2 inhibitörü gibi ajanlar da yeni tedavi seçenekleri arasındadır. Bu sunumda 20 yaşında nüks ile seyreden yeni moleküler sınıflamaya göre "SMARCB1- eksikliği olan sinonazaal karsinom" olgusu ile histopatolojik ve immunohistokimyasal bulguların önemini vurgulamak ve bu antitenin varlığının farkındalığını artırmak istedik.
Anahtar Kelimeler: Sinonazal karsinom, SMARCB1, INI-1, SMARCB1 (INI-1) eksikliği, sinonazal indiferansiye karsinom

***Informed Consent:** Informed consent was obtained from the patient (with the consent form obtained preoperatively). In addition, the consent form prepared by the journal for case presentations was signed by the patient and this form was uploaded to the system.

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1. Introduction

Benign conditions (non-neoplastic and neoplastic) in the paranasal sinuses and nasal cavity are frequently encountered in our daily routine. Malignant tumors of this region are very rare, approximately 3-5% of all head and neck tumors (1). They usually have a poor prognosis. The most common types are squamous cell carcinoma and adenocarcinoma. Defined in the 2017 4th edition of the World Health Organization Classification of Head and Neck Tumors blue book, sinonasal undifferentiated carcinomas was a general title used for tumors without squamous and glandular features (2). In this classification, sinonasal malignancies included conventional squamous cell carcinoma, non-keratinized squamous cell carcinoma, adenocarcinoma (intestinal type and non-intestinal type), neuroendocrine carcinoma, poorly differentiated carcinoma, sinonasal undifferentiated carcinoma (as defined above) and other very rare subtypes (3). Today, with the developments in the field of molecular biotechnology, significant revisions have been made in the 2022 5th edition of the WHO Classification of the Head and Neck Tumors compared to the previous versions with newly added molecular groups. Under the general heading of sinonasal undifferentiated carcinomas, different malignancies were included as a separate entity; nuclear protein in testis (NUT) midline carcinoma (NMC), human papillomavirus (HPV)-related multiphenotypic carcinoma, SWItch/Sucrose Non-Fermentable (SWI/SNF) complex-deficient carcinomas (3). The latter entity consists of two major subtypes, SMARCB1-deficient sinonasal carcinoma and SMARCA4-deficient sinonasal carcinoma, which are caused by the loss of one of the SWI/SNF complex genes (4, 5). Most of such cases were misdiagnosed as neuroendocrine carcinoma, poorly differentiated carcinoma, sinonasal undifferentiated carcinoma and teratocarcinoma in previous years according to our current knowledge. SMARCB1-deficient sinonasal carcinoma has an aggressive course and since it is rare, few cases (approximately less than 200 cases) have been reported in the literature. In this article, we present a case of “SMARCB1 deficient sinonasal carcinoma” according to the new molecular classification in late adolescence and emphasize the importance of histopathological and immunohistochemical findings.

2.Case Presentation

2.1.Chief complaints: A 20-year-old female patient had intermittent epistaxis for the last 4 months and was admitted to the emergency department because of increased epistaxis for the last 3 days.

2.2.Personal history: She underwent ovarian cystectomy operation due to ovarian torsion 2 years ago. She has penicillin allergy.

2.3.History of illness and imaging examinations: Nasal examination in the emergency room revealed a necrotic mass in the right nasal passage originating from the middle meatus and leaning against the septum. Magnetic resonance imaging (MRI) showed a mass approximately 47x46x45mm in size extending into the nasopharynx infiltrating the turbinates in the nasal cavity, extending beyond the medial wall, extending into the maxillary sinus, ethmoid cells, terminating in the frontobasal, causing destruction of the olfactory fossa and foveo ethmoidalis, forming indentation into the intracranial space, and extending into the nasopharynx. PET-CT evaluation revealed a hypermetabolic expansile mass starting from the right half of the nasal cavity, infiltrating the septum in the midline, extending to the right lateral aspect of the nasopharynx and right maxillary sinus, showing indentation into the intracranial space, and reaching the sphenoid sinüs (Figure 1 and 2). Lymph nodes were seen in the cervical region without significant increase in metabolic activity. There were no findings in favor of metastatic lesions in all other body areas.

2.4.Histopathologic evaluation: The excision materials of the right nasal passage and the right middle mea mass were approximately 3 cm in the largest dimension and were grayish-brown, curated in places, with areas of bleeding. Histopathologic examination revealed fragments with indistinct sinonasal respiratory type mucosa. Immediately below the mucosa, an infiltrative tumor was (Figure 3) . The stroma was fibrotic with vascular structures in very narrow areas. Monomorphic appearance was dominant in most areas (Figurre 4). Nucleus size was significantly increased in the tumour cells and there was chromatin coarsening or prominent nucleolus (Figure 5). Diffuse mitotic figures were seen. Cells with eccentric nuclei and large acidophilic

cytoplasm were remarkable. Occasional bizarre pleormorphic cells were noticeable even at medium magnification. Foci of necrosis were seen intermingled with the tumor. The surface epithelium of all tissue samples was carefully evaluated for dysplasia. Immunohistochemically, CytoAE1/AE3, Cyto7, oscar keratin were positive (Figure 6). p63, p40, Cyto5/6, Cyto20, vimentin, desmin, S-100, Melan-A, SOX-10, LCA (CD45RO), synaptophysin, chromogranin, CD117, CD99 were negative. There was no staining with EBV and p16. Loss of SMARCB1 (INI-1) expression was demonstrated in tumor cells. Ki-67 proliferation index was found to be as high as 90%. With these findings, it was diagnosed as "poorly differentiated sinonasal carcinoma". Immunohistochemical INI-1 loss was interpreted in favor of SMARCB1-deficient sinonasal carcinoma. However, it was stated that NUT staining would be appropriate to clearly rule out the diagnosis of NUT carcinoma because he was a young patient (NUT antibody was not available in our laboratory during this period, so it could not be performed).

2.5.Treatment, Outcome and Follow-up: In the multidisciplinary head and neck study group, as a result of the evaluation of the patient with imaging studies, it was decided that the required chemoradiotherapy area was large and therefore only induction chemotherapy (3 cycles of DCF treatment -Dosetaxel+Cisplatin+5-Fluorouracil) should be administered to the patient. The patient was seen again by radiation oncology with response evaluation examinations and received concurrent chemoradiotherapy with cisplatin. Approximately seven months later, the cervical lymph node, which was suspicious on imaging studies, was evaluated by biopsy. Cisplatin + 5-Fluorouracil + Cetuximab treatment was started due to recurrence. The patient who received 4 cycles of chemotherapy with the last treatment was evaluated again in the head and neck study group with imaging examinations after treatment. Contrast-enhanced MRI revealed a space-occupying lesion with a transverse diameter of 18 mm at the level of the middle meatus on the right in the medial inferior orbital medial inferior to the maxillary osteum and ethmoidal infundulum. Right cervical lymph nodes were fusiform with a size of 18 mm. A mass lesion at the level of the right middle meatus was evaluated as recurrence. PET-CT suggested that the mass to the right of the nasal cavity might be compatible with recurrence. Lymph nodes were interpreted more in favor of reactive. However, due to the young age of the patient and the findings in favor of recurrence, a wide area operation including the mass material, right maxillary sinus, ethmoid, skull base, left submandibular gland and neck dissection was performed.

2.6.Histopathologic evaluation in recurrent tumor: The morphology of the mass material was similar to the tumor in the first operation material. In the young patient, auxiliary methods were again used for the differential diagnosis of sinonasal tumors and to clarify the molecular typing. The tumor was positive for cytoAE1/AE3, Cyto8/18, Cyto7. There was no staining with neuroendocrine markers except focal-faint CD56 positivity in one fragment. Lymphoid markers were also negative. CD99 was applied to exclude Ewing sarcoma/PNET group tumors and no staining was observed. Morphologically, squamous differentiation was not clearly seen, and squamous differentiation was excluded with p63, p40 and Cyto5/6 negativity. Although p63 and p40 negativity excluded NUT carcinoma, NUT-1 staining was performed for definitive diagnosis (it could not be performed at the time of the first biopsy). No staining with NUT-1. Loss of SMARCB1 (INI-1) expression in tumor cells was clearly demonstrated (Figure 7). There was no evidence of malignancy in other specimens. Lymph nodes were also reactive.

2.7.Molecular Final Diagnosis: SMARCB1-deficient sinonasal carcinoma was diagnosed with morphologic findings and immunohistochemical staining.

2.8.Outcome and Follow-up: The patient is still being followed up at 3-month intervals in the postoperative period.

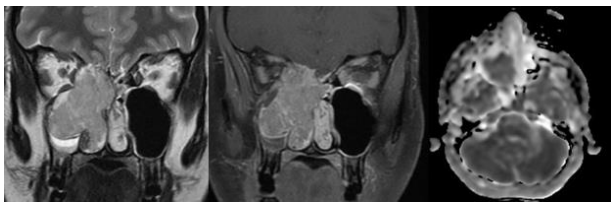

Figure 1. In coronal T2-weighted and post-contrast T1-weighted sections, invasion of the mass into the dura at the skull base and the extraconal space of the medial orbital wall is observed. In the axial ADC map, diffusion restriction (ADC value: $0.8x10^{-3}$), supporting a highly cellular and high-grade tumor, is noted.

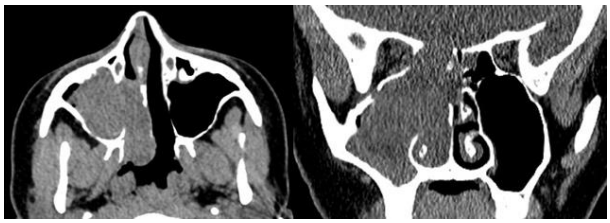

Figure 2. In axial and coronal non-contrast CT sections, a soft tissue mass is observed filling the right nasal cavity, extending into the conchae, ethmoid cells, and maxillary sinus, causing destruction in the medial wall of the maxillary sinus, medial orbital wall, nasal septum, and ethmoid roof.

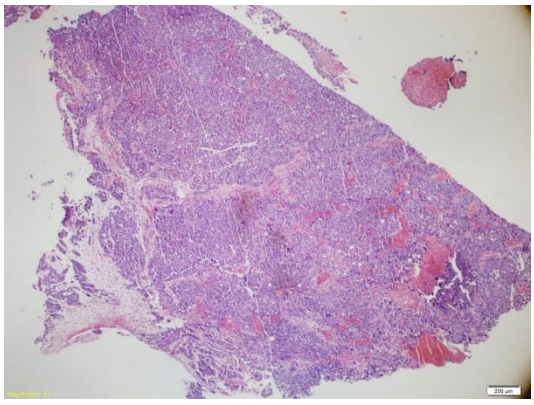

Figure 3. Tumor islands with a basaloid appearance in a diffuse pattern in the submucosal area.

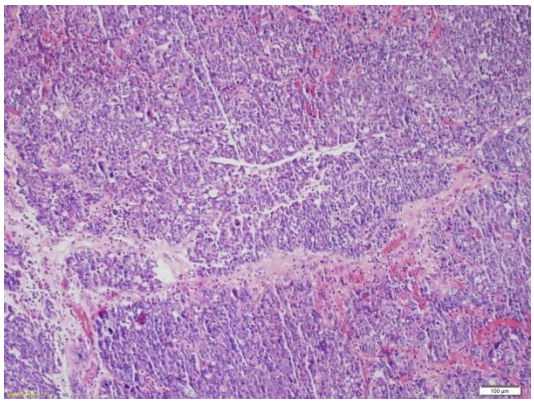

Figure 4. A diffuse, solid growth pattern with a monomorphic appearance was predominant in the majority of the tumor.

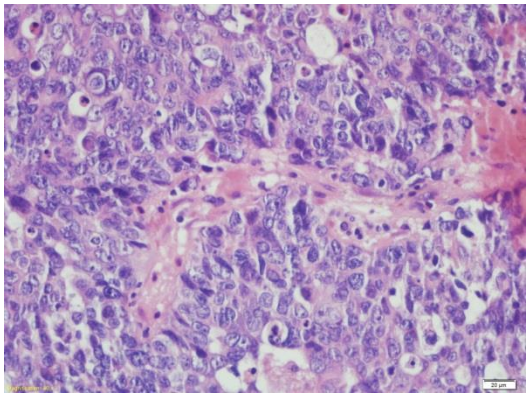

Figure 5. At higher magnification, tumor cells in certain areas exhibit chromatin clumping, prominent nucleoli, and marked pleomorphism.

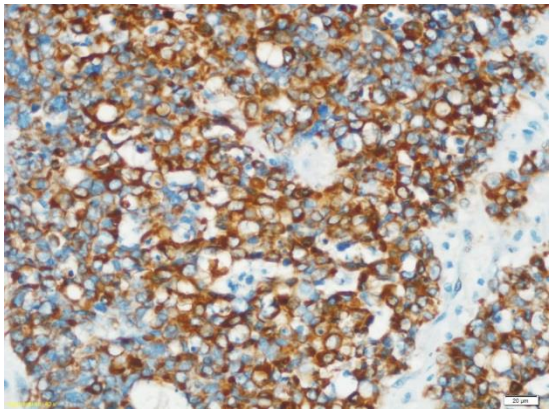

Figure 6: Immunohistochemically, tumour cells are positive for oscar keratin

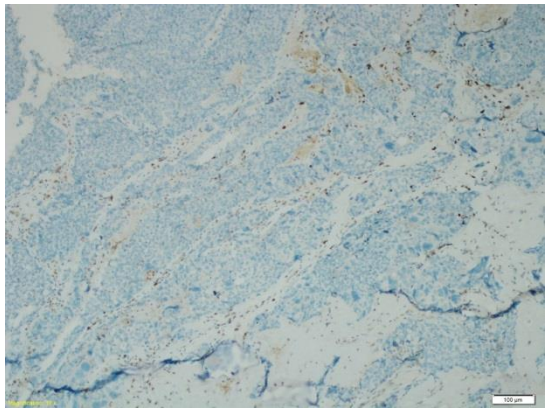

Figure 7: Sinonasal carcinoma with SMARCB1 deficiency is characterized by the loss of SMARCB1 (INI1) expression, while staining remains preserved in blood vessels and stroma.

3.Discussion

SMARCB1-deficient sinonasal carcinoma was first described in 2014 by two different authors in the same issue of the same journal in different papers (6, 7). Then, in 2017, "SMARCB1-deficient sinonasal carcinoma" was classified as a sinonasal undifferentiated carcinoma by WHO. With the developments in recent years, sinonasal carcinomas have been classified according to their new molecular profiles, as has been done in other malignancies. Thus, in the latest WHO edition of

head and neck tumors, separate entities were defined as NUT midline, SMARCA4-deficient, SMARCB1-deficient sinonasal carcinomas. The most common among these are sinonasal carcinomas that occur with loss of SMARCA4 and SMARCB1 by affecting SWI/SNF complex genes. SMARCB1 is a tumor suppressor gene located on chromosome 22q11. SMARCB1 loss is not only seen in SMARCB1-deficient sinonasal carcinomas. It can also be seen in various malignancies such as extraskeletal myxoid chondrosarcoma, myoepithelial carcinoma of soft tissues, malignant peripheral nerve sheath tumor (epithelioid type), epithelioid sarcoma. SMARCB1-deficient sinonasal carcinoma has two basic morphologic patterns including basaloid and plasmacytoid (8). The most common basaloid pattern is characterized by undifferentiated or "blue cell tumor" appearance in the form of solid layers, nests and trabeculae. The cytoplasm is usually very narrow. Prominent nucleolus is remarkable (9). The other pattern is the group of plasmacytoid/rhabdoid tumors. In contrast to the basaloid pattern, it has a "pink cell tumor" appearance. It is characterized by cells with eccentric nuclei and abundant abundant acidophilic cytoplasm. In general, rhabdoid cells are seen in almost all SMARCB1-deficient sinonasal carcinomas. Mitotic figures are very frequent. Necrosis is also a very common finding. With this appearance, it has highly aggressive histologic features. Prominent squamous and/or glandular differentiation is not an expected finding. However, squamous, squamous papillary, glandular (non-intestinal adenocarcinoma), clear-cell and yolk-salk pattern can be seen in decreasing rates. Carcinoma in situ or epithelial dysplasia is not seen in the surface epithelium.

Although SMARCB1-deficient sinonasal carcinoma is considered as a separate entity from undifferentiated sinonasal carcinoma with the new molecular classification, their morphologies overlap and they are defined as "small blue round cell tumor". Therefore, the morphological differential diagnosis spectrum includes many tumors including subtypes of undifferentiated sinonasal carcinoma, poorly differentiated sinonasal carcinoma, NUT carcinoma, lymphoma types, melanoma, rhabdomyosarcoma, olfactory neuroblastoma, Ewing sarcoma, and tumors with rhabdoid morphology. In our case, the tumors mentioned above were included in the differential diagnosis. The absence of surface epithelial dysplasia (including carcinoma in situ) in the microscopic evaluation morphologically excluded poorly differentiated squamous cell carcinoma and basaloid squamous cell carcinoma. Immunohistochemically, these tumors are reactive with p63, p40, Cyto5/6. These antibodies were negative in our case. Thus, we completely excluded the diagnosis of squamous cell carcinoma. Similarly, in melanoma, we usually expect to see the in situ component at least in one area. In addition, positivity with SOX-10, Melan-A and S-100 is compatible with melanoma. In our case, there was no in situ component and the negativity of the above-mentioned melanoma markers led us away from the diagnosis of melanoma. In terms of differential diagnosis, morphologically Ewing sarcoma was also an entity that should be excluded. Ewing sarcoma has diffuse membranous staining with CD99. CD99 was negative in our case. The neuroendocrine markers we applied to differentiate possible neuroendocrine carcinoma were negative. Loss of SMARCB1 (INI-1) expression in tumor cells was clearly seen. The staining of nonneoplastic lymphocytes and endothelium of vascular structures in the background was considered as internal control. Another tumor with loss of SMARCB1 (INI-1) in the head and neck region is malignant rhabdoid tumor. However, this tumor is almost always seen in children under 3 years of age. Differential diagnosis is difficult especially in small biopsies. The presence of a characteristic paranuclear dot-like pattern with vimentin supports malignant rhabdoid tumor. There was no staining with vimentin in our case. Negative lymphoid markers also excluded the possibility of lymphoma. In conclusion, we eliminated many tumors in the differential diagnosis with the loss of SMARCB1 (INI-1) expression.

A systematic review including 128 cases of SMARCB1-deficient sinonasal carcinoma was recently published by Lee et al. (10). Although nodal metastasis was approximately 6%, it was found to be at a regionally advanced stage at the time of diagnosis. Metastatic status was similar to lymph node metastasis. This study is the largest series to date. Since SMARCB1-deficient sinonasal carcinoma cases are rare, the optimal treatment approach is limited by institutional experience. Radical resection/surgery followed by adjuvant treatment has been recommended in large series (10, 11). Although there is a consensus on multimodal treatment, there is no complete agreement on the sequence of this treatment. With the definition of such new

entities, targeted treatment possibilities are also on the agenda. Although immune checkpoint inhibitors are increasingly being used in head and neck squamous cell carcinomas, data on their efficacy in SMARCB1-deficient sinonasal carcinomas are very limited. In a recent study, two cases of SMARCB1-deficient sinonasal carcinoma with and without immunotherapy were compared (12). The patient who received immunotherapy (anti-PD1-tislelizumab) had a longer disease-free survival. However, it needs to be supported by more clinical evidence. When SWI/SNF complex function is impaired in these tumors, EZH2 activity increases. EZH2 also promotes the oncogenic pathway. The EZH2 inhibitor Tazemetostat (EPZ-6438) may be an effective agent in SMARCB1-deficient sinonasal carcinomas (13). A study evaluating the antitumor effect of tazemetostat in the treatment of SMARCB1-deficient sinonasal carcinomas has begun (14).

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Conclusions

SMARCB1-deficient sinonasal carcinoma is a newly described rare tumor with a very aggressive clinical course. Histopathologically, the uniform cytological features and appearance mimicking many tumors make the diagnosis difficult, especially in small biopsies. It is very important to correctly name this high-grade malignancy within the scope of molecular classification. Accurate and early diagnosis, multimodality management, evaluation of new and targeted treatment options may improve the poor prognosis and survival.

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Hipertansiyon ve Nutrigenetik

Hypertension and Nutrigenetics

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Abstract: Hypertension is a multifactorial disease characterized by systolic blood pressure values of 140 mmHg or more and/or diastolic blood pressure values exceeding 90 mmHg and is caused by a complex interaction of genetic and environmental factors. Dietary habits play a critical role among these environmental factors and can significantly affect the risk of hypertension in interaction with genetic predisposition. Recent nutrigenetic research has revealed in more detail the different responses of individuals' genetic makeup to nutrient intake and the effects of these responses on the development of hypertension. Genetic polymorphisms, especially single nucleotide polymorphisms, may affect risk levels by modulating the physiological responses of individuals to nutrients and thus hypertension. Therefore, personalized nutritional approaches tailored to individuals' genetic profiles are considered an effective strategy for the prevention and management of hypertension. This approach has the potential to make significant contributions to the development of more individualized and targeted treatment methods by taking into account the complex interaction between genetics and nutrition.
Keywords: Hypertension, Nutrigenetics, Polymorphism

Etik Bilgiler
Etik Bilgiler Etik Kurul Onayı: Bu makale bir derleme yazısı olduğu için Etik Kurul Onayı alınmasına gerek yoktur.
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Yazar Katkı Oranları: Cerrahi ve Tıbbi Uygulamalar: LG. Konsept: LG. Tasarım: LG. Veri Toplama veya İşleme: LG. Analiz veya Yorum: LG. Literatür Taraması: LG. Yazma: LG.
Çıkar Çatışması Bildirimi: Yazar çıkar çatışması olmadığını beyan etmiştir
Destek ve Teşekkür Beyanı: Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

Özet: Hipertansiyon, 140 mmHg veya daha yüksek sistolik ve/veya 90 mmHg'yi aşan diyastolik kan basıncı değerleriyle tanımlanan, genetik ve çevresel faktörlerin karmaşık etkileşimi sonucu ortaya çıkan multifaktöriyel bir hastalıktır. Beslenme alışkanlıkları, bu çevresel faktörler arasında kritik bir rol oynamakta ve genetik yatkınlıkla etkileşim halinde hipertansiyon riskini önemli ölçüde etkileyebilmektedir. Son yıllarda yapılan nutrigenetik araştırmalar, bireylerin genetik yapılarının besin alımına verdiği farklı yanıtları ve bu yanıtların hipertansiyon gelişimi üzerindeki etkilerini daha detaylı bir şekilde ortaya koymaktadır. Genetik polimorfizmler, özellikle tek nükleotid polimorfizmleri, bireylerin besinlere ve dolayısıyla hipertansiyona karşı gösterdikleri fizyolojik yanıtları modüle ederek risk düzeylerini etkileyebilmektedir. Bu nedenle, bireylerin genetik profillerine uygun kişiselleştirilmiş beslenme yaklaşımları, hipertansiyonun önlenmesi ve yönetimi için etkili bir strateji olarak değerlendirilmektedir. Bu yaklaşım, genetik ve beslenme arasındaki kompleks etkileşimi dikkate alarak, daha bireyselleştirilmiş ve hedefe yönelik tedavi yöntemlerinin geliştirilmesine önemli katkılar sağlayabilme potansiyeline sahiptir.
Anahtar Kelimeler: Hipertansiyon, Nutrigenetik, Polimorfizm

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1. Giriş

Avrupa Kardiyoloji Derneği (ESC) 2024 kılavuzlarına göre hipertansiyon (HT), sistolik kan basıncı (SKB)'nin ≥140 mmHg veya diyastolik kan basıncı (DKB)'nin ≥90 mmHg değerleriyle tanımlamaktadır. Buna ek olarak, "Yüksek Kan Basıncı" adında yeni bir kategori tanımlanmıştır. Bu kategori, 120-139 mmHg SKB veya 70-89 mmHg DKB'ye sahip bireyleri kapsamaktadır (1). Genetik, çevre, yaşam tarzı gibi çeşitli faktörlerden etkilenen bir durum olan HT, esansiyel veya sekonder olarak kategorize edilmektedir. Esansiyel hipertansiyon (EH), hipertansif popülasyonun yaklaşık %95'ini oluşturur ve belirgin bir tanımlanabilir neden olmaksızın yüksek tansiyonla ilgilidir. Buna karşılık sekonder HT vakaların %5-15'ini oluşturur ve altta yatan spesifik bir nedene bağlı bir komplikasyon olarak ortaya çıkmaktadır (2). EH, yüksek kardiyovasküler morbidite ve mortaliteye neden olan yaygın bir hastalık olmakla birlikte, koroner kalp hastalığı, serebral enfarktüs ve diğer çeşitli kardiyovasküler ve serebrovasküler rahatsızlıklar için önemli bir risk faktörüdür. Dünya çapında EH nedeniyle yılda yaklaşık 7,5 milyon ölüm meydana gelmektedir (3). 2025 yılında, HT'den etkilenen yetişkin sayısının yaklaşık %60 oranında artarak toplam 1,56 milyar kişiye ulaşacağı öngörülmekte olup HT'nin yaşlı popülasyon arasında yaygın olduğu vurgulanmaktadır (4). Hastalıkların yaygın bir belirtisi olan yüksek kan basıncına sahip olması nedeniyle, EH artan bir şekilde bir hastalık yerine bir sendrom olarak kabul edilmektedir. (5). Beslenme, genlerle etkileşime geçen önemli bir çevresel faktör olarak kabul edilmekle birlikte, makro ve mikro besin ögelerine ilişkin genel önerilerin her bireyi aynı şekilde etkilemediği gözlemlenmiştir. Bu nedenle, genom ile besin maddeleri arasındaki etkileşimlerin moleküler düzeyde bilinmesi, nutrigenomik ve nutrigenetik bilimlerinin ortaya çıkmasına yol açmıştır (6). Tek nükleotid polimorfizmleri (SNP'ler), insan genetik dizisindeki yaklaşık %90'lık bir varyasyondan sorumlu olan DNA'nın tek bir bazında meydana gelen değişiklikleri ifade etmektedir (7).

Nutrigenetik, bireyin genetik geçmişinin beslenmeyi nasıl etkilediğini anlama sürecini ifade etmekte ve SNP çalışmaları, Nutrigenetik alanında kategorize edilmektedir (8). HT'nin Mendel formları ile ilişkili birçok gen tanımlanmış ve ilişkili patofizyolojik mekanizmalar çözülmüş, bu da hedefe yönelik tedavilere yol açmıştır (9). Birçok genom çapında ilişkilendirme çalışması (GWAS), HT'yi nicel bir özellik olarak değerlendirmiş ve hipertansif hastalarda SNP'lerin insidansını incelemiştir. İncelemeler sonucunda, yüksek tansiyonla ilişkili görünen 90'dan fazla farklı genetik polimorfizm tespit edilmiştir. Genetik polimorfizmlerle ilişkilendirilen HT konusundaki en çok ilgi, sodyum taşıma ile ilişkili genlere, vazoaktif hormonların veya sempatik-parasempatik aktivitenin düzenlenmesine katkı sağlayan genlere ya da renin-angiotensin sistemi gibi vasküler tonusunu düzenleyen diğer sistemlere odaklanmıştır (10).

Bu derleme, HT'nin genetik bileşenleri ile beslenme arasındaki etkileşimi anlamayı ve bu etkileşimlerin kişisel beslenme yaklaşımlarına nasıl yansıyabileceğini inceleyerek nutrigenetik temelli yeni bakış açıları sunmayı amaçlamaktadır.

2. Hipertansiyonla İlgili Gen Polimorfizmleri

Renin-angiotensin (RAS) ve kallikrein-kinin (KKS) sistemlerindeki genetik varyasyonlar, her iki sistemin regülasyondaki rolü göz önünde bulundurularak, kan basıncı düzenlenmesiyle ilişkilendirilmiştir (11). Bu anlamda RAS, kan basıncının normal düzeyin altına düşmesiyle tetiklenen ve böbreklerden salgılanan renin enziminin aktivasyonuyla başlamaktadır. Renin'in birincil etkisi, karaciğer tarafından salgılanan anjiyotensinojenin (AGT) anjiyotensin I'e dönüştürülmesini içermektedir. Daha sonra, anjiyotensin dönüştürücü enzim (ACE), anjiyotensin I'i anjiyotensin II'ye (Ang II) dönüşümünü sağlamaktadır. Ang II ise kan damarı duvarlarını kaplayan düz kas hücrelerinde vazokonstriksiyonu indükleyerek kan basıncının yükselmesinde görev almaktadır. Ayrıca Ang II, adrenal bezlerde bulunan zona glomerulosa hücrelerinden aldosteron salınımını tetikleyerek vücuttaki sıvı ve elektrolit dengesinin düzenlenmesine katkıda bulunmaktadır (3). AGT geni polimorfiktir ve 20'den fazla varyantı tespit edilmiştir. Bu varyantlar arasında en yaygın olan iki nokta mutasyonunun T174M ve M235T polimorfizmleri olduğu bildirilmiştir. Bu polimorfizmler, genin 702. bazında meydana gelen T-C değişikliği ile 235. pozisyonda metiyoninin treonin ile değiştirilmesi sonucunda ortaya çıkmaktadır. Farklı çalışmalar, AGT plazma seviyeleri ve genetik polimorfizmi ile EH arasında bir ilişki bulunduğunu göstermiştir (12).

Kallikrein-kinin, bradikinin B2 reseptörleri (BDKRB2) aracılığıyla etki gösteren ve vazodilatasyona neden olan bradikinin yoluyla çalışmaktadır. G proteinine bağlı BDKRB2 reseptörleri, her ikisi de güçlü vazodilatörler olan

prostaglandinlerin ve nitrik oksitin salınımını teşvik ederek bir dizi reaksiyonu başlatmaktadır. KKS sistemi için en çok incelenen polimorfizmlerden biri, ürününün transkripsiyonunu etkileyen BDKRB2 geninin rs1799722 polimorfizmidir. Burada C alleli, reseptörün azalmış ekspresyonuyla ilişkilendirilmektedir (11). Hipertansiyon gelişimi için potansiyel aday olarak gösterilen başka bir genetik varyant, NOS3 Glu298Asp'dir. Araştırmalar, NOS3 geninin A alelinin endotel hücrelerinde ve vasküler dokularda proteolitik parçalanmaya daha duyarlı olduğunu göstermiştir. Bu durumun fonksiyonel eNOS seviyelerinin azalmasına neden olabileceği bildirilmektedir. Vazokonstriksiyon ve vazodilatasyonu dengeleyerek kan basıncının korunması için Ang II ve nitrik oksit (NO) arasında homeostaz gerekli olup bu olaylar AGT ve NOS3 genlerinin etkisiyle düzenlenmektedir (13).

Metilen Tetrahidrofolat Redüktaz

Metilen tetrahidrofolat redüktaz (MTHFR), homosisteini metionine dönüştürerek serum homosistein seviyesini düşürmekten sorumlu bir enzim olarak ifade edilmektedir. Metiltetrahidrofolat, homosisteinin remetilasyon metabolizmasında metil grubu donörü olarak yer almaktadır. 5,10-metilentetrahidrofolat'ın 5-metiltetrahidrofolata indirgenmesindeki düzenleyici enzim olan MTHFR genindeki mutasyonlar gibi genetik faktörlerin, hiperhomosisteinemiden sorumlu olduğu bildirilmektedir. Bununla birlikte B12 vitamini ve folat eksikliği gibi beslenme faktörleri, serum homosistein seviyelerindeki yükselme ile ilişkilendirilmiştir. Bunun nedeninin homosisteinin metionine metilasyonunda sırasıyla koenzim ve metil grubu donörü olarak yer almaları olduğu bildirilmiştir (14). Toplam 16.571 katılımcının (4.830 EH olgusu) yer aldığı 11 çalışma derlenmiştir. Meta-analiz bulguları, yüksek plazma homosistein düzeylerinin EH riskiyle ilişkili olduğunu göstermektedir (15). MTHFR C677T/A1298C polimorfizmlerinin EH riski üzerindeki etkilerinin incelendiği bir meta-analiz çalışmasında C677T polimorfizmi için 5207 vaka ve 5383 kontrol içeren 30 çalışma; A1298C polimorfizmi için 1009 vaka ve 994 kontrol içeren 6 çalışma incelenmiştir. Yapılan meta-analiz sonuçları, MTHFR C677T polimorfizminin EH riskini artırdığını gösterirken MTHFR A1298C polimorfizmi ile EH riski arasında anlamlı bir ilişki bulunamamıştır (16). Yapılan bir başka çalışmanın sonuçları, kardiyovasküler hastalıklar için bilinen bir risk faktörü olan hiperhomosisteineminin, folat/vitamin B12 beslenme eksikliği ile C677T (rs1801133) ve A1298C (rs1801131) MTHFR gen polimorfizmleri ile ilişkili olduğunu göstermiştir (14).

Katekol-O-metiltransferaz

Katekol-O-metiltransferaz (COMT), S-Adenozil Metiyonin'den dopamin, epinefrin ve norepinefrin gibi katekol nörotransmiterlere metil grubu aktaran yaygın bir enzimdir. COMT'un genetik varyantları, bazı popülasyonlarda EH ile ilişkilendirilmiştir (17). İnsanlardaki COMT geni, 22. kromozom üzerinde bulunur ve 158. kodondaki ekson 4'te, valin-metiyonin amino asit değişimine yol açan SNP'leri içermektedir. Genin işlevini etkilemesi nedeniyle bu değişikliğin önemli olduğu ifade edilmektedir. Met/Met taşıyıcıları, Val/Val taşıyıcılarına kıyasla belirli kimyasalları (dopamin gibi) parçalama konusunda yaklaşık üç ila dört kat daha az yetenek göstermekte dolayısıyla dopamin kullanılabilirliğinin artmasına neden olmaktadır. Bununla birlikte Met/Val heterozigotları orta düzey enzimatik aktivite göstermektedir. Japon erkekleri ile yapılan bir çalışmada, Met/Met taşıyıcısı olma ile HT prevalansı arasında anlamlı bir ilişki bulunmuştur (18).

DHCR7 Geni

Yapılan çalışmalar D vitamini yetersizliğinin de HT için risk faktörü olduğunu göstermektedir (19). DHCR7 geni, 7-dehidrokolesterol redüktaz (DHCR7) adı verilen bir enzimi kodlamaktadır. Endoplazmik retiküler/nükleer transmembran enzimi olan DHCR7, 7-dehidrokolesterolden kolesterol sentezinde görev almaktadır. 7-dehidrokolesterol aynı zamanda D vitamininin bir formu olan 25(OH)D3 sentezinin öncüsüdür. DHCR7 aktivitesi, kolesterol yapımı ile D vitamini oluşumu arasında geçiş görevi görmektedir. DHCR7 enzimatik aktivitesi yüksek olduğunda, D vitamini sentezi için 7-dehidrokolesterol'ün substrat bolluğu azalmaktadır (20). D vitamininin aktif formu olan kalsitriol'e dönüşümü iki hidroksilasyon reaksiyonunu içermektedir. Başlangıçta karaciğerde D vitamini, CYP2R1 enzimi tarafından 25(OH)-D vitamini [25(OH)D]'ye metabolize edilmektedir. Daha sonra böbrekte CYP27B1 enzimi, 25(OH)D'nin hidroksilasyonunu katalize ederek 1,25(OH)2-vitamin D (kalsitriol) olarak bilinen biyolojik olarak aktif formu üretmektedir (21). Yapılan bir çalışmada, CYP2R1'in rs70141657 ve D vitamini bağlayıcı proteinin rs7041T/G ve rs4588C/A genetik polimorfizmleri, sağlıklı Ürdünlü bireylerde D

vitamini eksikliği riskinin artmasıyla ilişkilendirilmiştir (22). Diğer yandan, NAD sentaz 1 enzimi (NADSYN1), NAD adlı bir koenzimin sentezini katalizlemektedir. Bu koenzim, 25(OH)D'nin de novo sentezinde ve hidroksilasyonunda görev almaktadır. Genom çapında yapılan birçok araştırma, DHCR7/NADSYN1 genetik bölgesindeki bazı SNP'lerin 25(OH)D seviyelerini etkilediğini ve HT, kardiyovasküler hastalıklar, raşitizm, romatoid artrit ve kanser gibi bir dizi hastalığı da etkilediğini bildirmiştir (20). 26 ila 84 yaş aralığındaki bireyleri içeren çift-kör ve randomize bir klinik çalışma yürütülmüştür. Bu çalışmaya D vitamini eksikliği veya yetmezliği olan hastalar dahil edilmiş ve bireyler rastgele olarak D vitamini takviyesi veya plasebo olmak üzere gruplara ayrılmışlardır. Müdahaleden önce ve müdahaleden bir ve iki ay sonra, katılımcıların SKB ve DKB'leri ölçülmüştür. Bulgulara göre, D vitamini takviyesinin SKB üzerindeki etkisi müdahaleden sonraki birinci ve ikinci ayda istatistiksel olarak anlamlı bulunmuştur. DKB üzerindeki etkisi ise müdahaleden sonraki ilk ayda anlamlıyken, ikinci ayda anlamlı etki gözlenmemiştir (23).

Apolipoprotein E

Hipertansiyonun büyük ölçüde dislipidemi ile ilişkili olduğu bilinmektedir. Apolipoprotein E (ApoE), lipid metabolizmasında çeşitli roller üstlenir; şilomikron kalıntılarının temizlenmesi, plazma kolesterol seviyeleri ve düşük yoğunluklu lipoprotein (LDL) ile çok düşük yoğunluklu lipoprotein (VLDL) dahil olmak üzere lipid metabolizmasında görev almaktadır. ApoE, LDL reseptörü ve ApoE'ye özgü bir reseptör için ana bağlayıcı olarak işlev görmektedir. ApoE geni, kromozom 19'da bulunur ve üç yaygın alele (ε2, ε3 ve ε4) ve altı farklı genotipe (ε2/2, ε2/3, ε2/4, ε3/3, ε3/4 ve ε4/4) sahiptir. En yaygın izoform olan ε3/3 genotipi, ApoE'nin yaklaşık %70-80'ini oluştururken, diğer genotipler mutant olarak kabul edilmektedir (24). ApoE alelleri ile genotiplerini vakalar ile kontroller arasında karşılaştıran 28 çalışma incelenmiştir. ApoE polimorfizmi ile HT arasında bir ilişki bulunmuştur: ε2 aleli taşıyan genotipler koruyucu bir faktör olabilirken, ApoE ε4 aleli ve ε4 aleli taşıyan genotiplerin HT için bir risk faktörü olabileceği ifade edilmiştir (24). Yapılan bir çalışmada ε4 genotipi taşıyan bireyler, daha yüksek oksidatif hasar ve kardiyovasküler risk faktörlerine rağmen biyoaktif bitki bileşenleri (örneğin, polifenoller, flavonoidler, karotenoidler gibi antioksidan ve antiinflamatuvar özelliklere sahip bitkisel bileşikler) gibi potansiyel olarak koruyucu diyet faktörlerine verilen yanıtta ε3 aleli taşıyıcılarına kıyasla daha düşük yanıt gösterdikleri bildirilmiştir. Veriler APOE3'ün çevresel değişikliklere daha esnek bir şekilde uyum sağlayabileceğini ve mikro besin alımı gibi çevresel faktörlere daha iyi yanıt verebileceğini göstermektedir (25).

Kromogranin A

Kromogranin A (CHGA) geni, başta adrenal medulla ve postganglionik sempatik aksonlardan eksprese olan bir gen olup katekolaminlerin depolanması ve salınımını düzenleyen intrasellüler ve ekstrasellüler mekanizmalarla ilişkilidir. EH'sı olan 50 hasta ile 32 sağlıklı bireyin periferik kan örnekleri alınarak CHGA geninin belirli polimorfizmlerinin incelendiği bir çalışma gerçekleştirilmiştir. Sonuçlar, CHGA geni promotor bölgesindeki T-1014C, T-988G, G-462A ve T-415C polimorfizmlerinin hasta ve kontrol grubu arasında anlamlı farklılıklar gösterdiğini ortaya koymaktadır (26).

CHRM3 Geni

CHRM3 reseptöründe meydana gelen mutasyonlar, vasküler düz kas hücrelerinde vazodilatasyonun azalmasıyla sonuçlanarak vasküler kasılma ve tonusun artmasına yol açmaktadır. Bu durum tuza duyarlı modellerde kan basıncının yükselmesine neden olmaktadır (27). Çin popülasyonunda önceden belirlenmiş bir kohort üzerinde, CHRM3 geninin belirli genetik varyantlarının tuz duyarlılığı, kan basıncı değişiklikleri ve HT gelişimi ile ilişkisini 14 yıllık takip süresi ile araştıran bir çalışma gerçekleştirilmiştir. CHRM3 genindeki SNP rs10802811 düşük tuz tüketiminin neden olduğu kan basıncı değişiklikleriyle bağlantılı bulunmuştur. Bunun yanı sıra, rs58359377 ve rs619288 polimorfizmlerinin kan basıncındaki değişikliklerle ve HT riskiyle bağlantılı olduğu saptanmıştır. Çalışmanın bulguları, CHRM3 geninin tuz duyarlılığı, kan basıncı düzenlenmesi ve HT gelişiminde potansiyel bir rol oynayabileceğini göstermektedir (28).

CYP11B2 ve ADD1 Geni

CYP11B2 ve ADD1, su-elektrolit metabolizmasında önemli bir rol oynayan iki aday gendir. Bu biyolojik sürecin bozulması, EH'nın önemli bir patojenik faktörü olarak kabul edilmektedir. CYP11B2 geni, sitokrom P450 enzim süper ailesinin bir üyesini kodlamaktadır. Sitokrom P450 proteinleri, ilaç metabolizmasında ve kolesterol, steroidler ve diğer

lipitlerin sentezinde rol alan birçok reaksiyonu katalize eden monooksijenazlar olarak bilinmektedir. Ek olarak, aldosteronun sentezi ve lizizi, aldosteron sentaz (CYP11B2) kullanılarak gerçekleşmektedir (29). ADD1 geni, sinyal iletimi ve renal sodyum taşınmasında rol oynayan α-adducin adlı bir hücre iskeleti proteinini kodlamaktadır. İnsanlarda, ADD1 geni kromozom 4p16.3'te lokalizedir. Özellikle, ADD1 p.G460W varyantı, renal sodyum-potasyum pompası aktivitesindeki artış, renal sodyum retansiyonu ve tuza duyarlı HT ile ilişkilendirilmektedir (30,31).

SLC4A5 Geni ve Kaveolinler

SLC4A5 geni, elektrojenik sodyum bikarbonat ortak taşıyıcısı olan NBCe2'yi kodlamaktadır (32). SLC4A5 genindeki SNP'ler sonucunda hiperaktif NBCe2'nin varlığı, tuza duyarlı bireylerin bir alt grubunda, SLC4A5 rs1017783 gibi NBCe2 polimorfizmleri ile ilişkili olarak renal sodyum bikarbonat yeniden emiliminde bir artışa neden olmaktadır. Bazı tuza duyarlı bireylerde artan renal sodyum yeniden emilimini hafifletmek için, NBCe2'nin artan sentezi ve/veya aktivitesinin engellenmesi yeni bir yaklaşım olarak düşünülmektedir (33).

Kaveolinler (Cav), kolesterol ve kalsiyum homeostazı ile t-tübül oluşumunda önemli bir rol oynamaktadır. Membran proteini olan Cav-1, CAV1 geninde kodlanmaktadır. CAV1 geninin 2. intronunda bulunan rs3807990 (22285 C>T) polimorfizminin HT ile ilişkili olabileceği düşünülmektedir (34). Hipertansiyon ile ilişkili bazı genetik polimorfizmler ve bu polimorfizmlerin hipertansiyon üzerindeki etkileri Tablo 1'de sunulmuştur.

Tablo 1. Hipertansiyon ile İlişkili Genetik Polimorfizmler ve Etkileri

Gen	Polimorfizm (SNP)	Etkilenen Fonksiyon	Klinik Önemi	Kaynak
ACE	I/D (rs4646994)	Anjiyotensin dönüştürücü enzim aktivitesi	ACE inhibitörü tedavisine yanıtı etkileyebilir	Wang ve ark. (3)
AGT	M235T (rs699)	Anjiyotensinojen seviyeleri	Anjiyotensin reseptör blokerleri tedavisine yanıtı etkileyebilir	Kılınç ve ark. (12)
ADD1	G460W (rs4961)	Sodyum taşıma ve kan basıncı düzenlemesi	Diüretik tedavisine yanıtı etkileyebilir	Zhang ve ark. (29)
MTHFR	C677T (rs1801133)	Homosistein metabolizması	Folat ve B12 vitamini takviyesine yanıtı etkileyebilir	Wu ve ark. (16)
COMT	Val158Met (rs4680)	Katekolamin metabolizması	Katekolaminerjik ilaçlara yanıtı etkileyebilir	Chi Htun ve ark. (18)
ApoE	ε4	Lipid metabolizması	Statin tedavisine yanıtı etkileyebilir	Shi ve ark. (24)
CHGA	T-1014C (rs4242432)	Katekolamin depolama ve salınımı	Sempatik sinir sistemi aktivitesini etkileyen ilaçlara yanıtı etkileyebilir	Eser ve ark. (26)
CHRM3	rs10802811	Muskarinik reseptör sinyalizasyonu	Tuz kısıtlaması ve diüretik tedavisine yanıtı etkileyebilir	Zhang ve ark. (28)
SLC4A5	rs1017783	Sodyum bikarbonat kotransportu	Diüretik tedavisine yanıtı etkileyebilir	Gildea ve ark. (32)
CAV1	rs3807990	Kaveolin-1 ekspresyonu	Kalsiyum kanal blokerleri tedavisine yanıtı etkileyebilir	Kurnaz Gömleksiz ve ark. (34)

3. Hipertansiyonla İlgili Gen Polimorfizmleri ve Beslenme

D Vitamini

Güneş ışığı maruziyeti ve ardından diyetin dolaşımdaki 25-hidroksi D vitamini konsantrasyonları üzerinde belirleyici olduğu düşünülse de artan kanıtlar genetik faktörlerin de D vitamini düzeylerini etkileyebileceğini göstermektedir (35). Yaşlı kadınlar üzerinde gerçekleştirilen bir çalışmada, D3 vitamini takviyesinin inflamatuar belirteçleri azalttığı ve D vitamini eksikliği olan bireylerde toplam antioksidan kapasiteyi artırdığı gözlemlenmiştir. D vitamini reseptörü (VDR) geninin BB/Bb genotipine sahip olan bireyler, bb genotipine sahip olanlarla karşılaştırıldığında takviyeye karşı daha fazla duyarlılık göstermiştir (35). Nutrigenetik bir değerlendirmenin, HT yönetiminde D vitamini takviyesini kişiselleştirerek uygulamak için ek bir araç olabileceği bildirilmektedir (36).

B9 ve B12 Vitamini

Plazma homosistein, tek karbon metabolizmasının entegre bir belirleyicisidir. Homosistein düzeyleri ile B6, B12 vitaminleri ve folat alımı arasında ters bir ilişki bulunmaktadır (37). Hiperhomosisteinemisi olan bireyler üzerinde yapılan prospektif bir kohort çalışmasında, folat metabolizmasıyla ilişkili genlerdeki polimorfizmlerin folik asit takviyesinin etkinliğini nasıl değiştirdiği değerlendirilmiştir. Katılımcılara 90 gün boyunca günde 5 mg folat verilerek tedavi öncesinde ve sonrasında homosistein düzeyleri ölçülmüştür. Ayrıca, MTHFR ve MTRR genlerindeki SNP'ler incelenmiştir. Folat takviyesinin homosistein seviyelerini düşürmedeki etkinliğinin, tedavi sonrasında, MTHFR'de rs1801133 ve rs1801131 SNP'lerini ve MTRR'de rs1801394 ve rs162036 SNP'lerini taşıyan katılımcılarda daha yüksek olduğu saptanmıştır (38). Danimarka'da üç toplum temelli çalışmadan (Inter99, Health2006 ve Dan-MONICA10) 12,532 yetişkinin dahil edildiği bir araştırma gerçekleştirilmiştir. Çalışmada, B12 vitamini ve folata ilişkin genetik risk skorlarının (GRS'lerin), kan basıncı ve lipidler arasındaki ilişkisi incelenmiştir. Serum B12 vitamini ve folat için oluşturulan GRS'ler, ilgili serum değerleriyle ilişkilendirilmiştir. Yapılan kombine analizler sonucunda, B12 vitamini GRS'leri ile kan basıncı ve lipitler arasında bir ilişki bulunamamıştır. Folatı artıran alellerin sayısının artması, yüksek yoğunluklu lipoprotein (HDL) kolesterol konsantrasyonlarıyla ilişkilendirilirken, kan basıncı, trigliserit, düşük yoğunluklu lipoprotein ve toplam kolesterol düzeyleri arasında herhangi bir ilişki gözlenmemiştir (39).

Omega-3

Kısa vadeli randomize kontrollü çalışmalar ve uzun vadeli kohort çalışmaları, hipertansif bireylerde ω-3 PUFA (omega-3 yağ asitleri) tüketiminin artması ile düşük kan basıncı arasındaki ilişkileri belirlemiştir (40). 450 metabolik sendromlu birey üzerinde yapılan bir çalışma, 12 hafta süren bir diyet yağ modifikasyonunun potansiyel NOS3 gen-besin etkileşimlerini anlamayı amaçlamıştır. Çalışmada, çeşitli genotip grupları arasında farklı inflamasyon ve dislipidemi belirteçleri tespit edilmiştir. NOS3 genindeki rs1799983 SNP'si ve plazma triaçilgliserol (TAG) konsantrasyonları ile plazma n-3 PUFA durumu arasında anlamlı bir ilişki saptanmıştır. Bulgular, bu bireylerin plazma TAG konsantrasyonlarını azaltmak için n-3 PUFA tüketiminin daha büyük fayda sağlayabileceğini düşündürmektedir (41). Vallée Marcotte ve arkadaşlarının sağlıklı bireyler üzerinde yaptığı bir çalışmada, katılımcılara 6 hafta süresince 5 gram balık yağı ile tedavi uygulanmıştır. Bu tedaviyi alan 208 katılımcı üzerinde yapılan çalışmada, omega-3 yağ asitleri takviyesine yanıt vermemeye neden olan trigliserit düzeylerinin kontrolüyle ilişkili altı gen üzerinde 31 SNP saptanmıştır (42).

Tuz

Yüksek kan basıncı, kardiyovasküler hastalıklar için bir risk faktörü olup farmakolojik ve diyetsel müdahaleleri gerektirmektedir. Yapılan çalışmalarda, tuz duyarlılığı kavramının ve bireylerin sodyuma farklı tepkiler verebilecek olmasının göz ardı edildiği bildirilmektedir. Çoğu diyet müdahalesi, kan basıncını düşürmek için sodyum alımını azaltmaya odaklanırken, tuz duyarlılığı fenotipinin dikkate alınması önemlidir. Bu kavram, her bireyin tuz konusunda aynı derecede duyarlı olduğunu varsaymak yerine, bireyler arasındaki farklılıkları vurgulamaktadır. (43). Genetik faktörlerle beslenme alışkanlıkları arasındaki etkileşimin, kan basıncı üzerindeki etkilerini normotansif yetişkinlerde doğrulamayı amaçlayan bir araştırmaya 335 yetişkin dahil edilmiş olup genetik polimorfizmler ile besin tüketimi arasındaki ilişki incelenmiştir. Çalışmada, rs699 polimorfizmi için G aleline sahip bireylerin, sodyum ve magnezyum tüketiminin artmasının kan basıncını etkilediği saptanmıştır. Ayrıca, bu alele sahip olanların, AA homozigotlarına kıyasla daha yüksek

SKB'ye sahip olduğu bulunmuştur. Bununla birlikte, rs1799722 polimorfizmine sahip bireylerin T aleli ile daha yüksek kalsiyum alımının, CC homozigotlarına göre daha yüksek SKB ve DKB seviyeleriyle ilişkili olduğu bildirilmiştir (11).

Diyet Modeli

DASH diyeti, HT'nin yönetilmesi ve kardiyovasküler sağlığın geliştirilmesi için önemli bir beslenme stratejisi olarak bilinmektedir. Bu diyette meyve, sebze, tam tahıllar, yağsız protein ve az yağlı süt ürünleri tüketimi teşvik edilirken sodyum, şekerli içecekler ve işlenmiş gıdaların alımı azaltılmaktadır. DASH diyetine uyumun sağlanması, bireylerin optimal kan basıncı seviyelerine ulaşmalarına ve bunu sürdürmelerine yardımcı olmaktadır (44).

4. Nutrigenetik Yaklaşımın Kapsamı ve Sınırlamaları

Nutrigenetik ve nutrigenomik alanlarının temel amacı, bireylerin genetik farklılıklarına bağlı olarak diyetin fenotipik etkilerini popülasyon düzeyinde incelemektir. Genetik çeşitlilik, vücudun metabolizmasını, bağırsak mikrobiyotasını ve besin emilim süreçlerini etkileyerek, insanların genel sağlık durumlarını ve yaşam kalitelerini şekillendirmektedir (45). İnsanların biyolojik özelliklerine uygun beslenerek sağlık avantajı elde edebilecekleri fikri, umut verici bir geleceği işaret etmektedir. Bu gelişim, klinik ve halk sağlığı alanlarında çalışan uzmanlar için önemlidir. Çünkü bu alandaki temel zorluklardan biri, genetik verilere dayalı kişiye özel beslenmeyi, bireylerin tercihlerine, yeme alışkanlıklarına, yaşam tarzlarına ve sosyokültürel faktörlere entegre etmektir. Bu konuda bir diğer önemli sonuç, sağlık profesyonellerinin konuya dair eğitim almasının gerekli olduğudur (46). Nutrigenetik alanında elde edilen verilerin klinik uygulamaya dönüştürülebilmesi için gen-besin etkileşimlerine dair daha fazla kanıta ihtiyaç duyulmaktadır. Öncelikle, kişiselleştirilmiş diyet gereksinimlerinin tanımının netleştirilmesinin önemli olduğu vurgulanmaktadır. Ayrıca, belirli genetik profillere sahip bireyler için en uygun besin alım kombinasyonlarının belirlenmesi önemlidir. Epidemiyolojik verilerin daha iyi anlaşılması, çeşitli diyet müdahaleleri sonrasında farklı popülasyonlarda gözlemlenen tepkilerin kaynaklarının anlaşılmasına katkı sağlayabilir. Bunun yanı sıra, optimize edilmiş müdahale ve önleme stratejileri geliştirmek, nutrigenetiğin halk sağlığı üzerindeki potansiyel etkilerini ortaya koymak açısından kritik öneme sahiptir (37).

5. Mevcut Bulguların Yorumlanması

Danimarka merkezli bir araştırmada, B12 vitamini GRS'leri ile kan basıncı ve lipitler arasında bir ilişki bulunamamıştır. Folatı artıran alellerin sayısının artması, yüksek yoğunluklu HDL kolesterol konsantrasyonlarıyla ilişkilendirilirken, kan basıncı, trigliserit, düşük yoğunluklu lipoprotein ve toplam kolesterol düzeyleri arasında herhangi bir ilişki gözlenmemiştir (39). Geleneksel gözlemsel analizler, genç yetişkinlerde homosistein konsantrasyonu ile kan basıncı arasında pozitif bir ilişki olduğunu göstermektedir. Ancak, Mendelyen randomizasyon analizleri, genetik olarak artmış homosistein seviyelerinin kan basıncı, özellikle de SBP ile ilişkili olduğuna dair güçlü bir kanıt sunmamıştır. Homosisteinin kan basıncındaki artışın bir nedeni mi yoksa yalnızca bir belirteci mi olduğu sorusunun önemli olduğu düşünülmektedir. Çünkü kan homosistein seviyeleri, B6, B9 ve B12 vitamini takviyeleri gibi güvenli ve düşük maliyetli müdahalelerle etkili bir şekilde düşürülebilmektedir (47).

Yapılan bir çalışmada, yaşlı kadınlarda D3 vitamini takviyesinin, inflamatuar belirteçleri azalttığı ve D vitamini eksikliği olan bireylerde toplam antioksidan kapasiteyi artırdığı saptanmıştır. Ayrıca, VDR geninin BB/Bb genotipine sahip bireylerin, bb genotipine sahip bireylere göre takviyeye daha duyarlı olduğu gözlemlenmiştir. Bu bulgular, D3 vitamininin potansiyel terapötik etkilerini ve genetik faktörlerin takviye cevabındaki rolünü vurgulamaktadır (35). Aksine, bir başka çalışmada, serum D vitamini (25(OH)D) düzeyleri ile kan SBP, DBP ve hipertansiyon riski arasındaki ilişkinin incelenmesi amaçlanmıştır. Norveç Trøndelag Sağlık Çalışması'ndan elde edilen verilerle yapılan kesitsel analizler, 25(OH)D'deki artışın SBP, DBP ve hipertansiyon prevalansında azalma ile ilişkili olduğunu göstermiştir. Ancak prospektif analizler ve Mendelyen randomizasyon yöntemleri, bu ilişkilerin nedensel olmadığını ve 25(OH)D düzeyleri ile kan basıncı arasında herhangi bir nedensel bağlantı bulunmadığını ortaya koymuştur (48). D vitamini takviyesinin farklı sağlık parametreleri üzerindeki etkilerini inceleyen bu iki çalışma, literatürdeki çelişkili bulguları yansıtmaktadır. Bir yandan, yaşlı kadınlarda D3 vitamini takviyesinin inflamatuar belirteçleri azaltması ve antioksidan kapasiteyi artırması, özellikle genetik yatkınlığı olan bireylerde potansiyel terapötik etkilerini ortaya koymaktadır.

Diğer yandan, geniş kapsamlı bir popülasyonda yapılan analizler, serum D vitamini düzeyleri ile kan basıncı arasında nedensel bir ilişki olmadığını göstermektedir. Bu farklı sonuçlar, D vitamininin etkilerinin karmaşıklığını ve bireysel farklılıkların önemini vurgulamaktadır. Özellikle, genetik faktörler, yaş, cinsiyet ve altta yatan sağlık koşulları gibi değişkenlerin, D vitamini takviyesine verilen cevabı etkileyebileceği göz önünde bulundurulmalıdır. NOS3 genindeki rs1799983 SNP'si ile plazma triaçilgliserol konsantrasyonları arasındaki ilişki, n-3 PUFA alımının bu bireyler için plazma TAG seviyelerini azaltmada daha büyük bir etki sağlayabileceğini göstermektedir (41). Bununla birlikte, Dumont ve arkadaşlarının rs174546 genetik varyantının PUFA alımından bağımsız olarak plazma trigliseritleri ve nonHDL-C seviyelerini düşürmesi, genetik çeşitliliğin beslenme stratejilerine olan etkisini desteklemektedir (49). RAS ve KKS sistemlerine ait genlerdeki fonksiyonel varyantların, kan basıncı modülasyonunda rol oynadığı daha önce belirtilmiştir. Ancak, mevcut literatürde bu varyantların nutrigenetik perspektiften incelendiği çalışmalar sınırlıdır.

6. Sonuç

Nutrigenetik araştırmalar, genetik ve beslenme arasındaki karmaşık etkileşimin, HT gibi kronik hastalıkların yönetimindeki kritik önemini vurgulamaktadır. HT, genetik yatkınlıklar ve çevresel faktörlerin dinamik etkileşimiyle karakterize edilen multifaktöriyel bir hastalıktır. Beslenme alışkanlıkları, çevresel bir faktör olarak, gen ekspresyonunu modüle ederek HT'nin patogenezi ve yönetiminde önemli bir rol oynamaktadır. Genetik polimorfizmler, bireylerin HT'ye olan yatkınlıklarını belirlemede temel bir faktör olarak öne çıkmaktadır. Bu bağlamda, bireylerin genetik profillerine dayalı olarak tasarlanan kişiselleştirilmiş beslenme stratejileri, HT'nin önlenmesi ve tedavisinde yenilikçi bir yaklaşım sunmaktadır. Gelecekteki araştırmalar, genetik testlerin ve özelleştirilmiş beslenme yaklaşımlarının klinik uygulamalara entegrasyonunu ve bu yaklaşımların kardiyovasküler hastalıkların yönetimindeki etkinliğini daha kapsamlı bir şekilde değerlendirmelidir. Bu gelişmeler, bireye özgü tedavi planlarının oluşturulmasında ve hastalık risklerinin azaltılmasında önemli bir potansiyel barındırmaktadır.

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Mezuniyet Öncesi Etik Eğitiminin Önemi, Psikiyatri Perspektifi

The Importance of Undergraduate Ethics Education, Psychiatric Perspective

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Abstract: Medical ethics education aims to provide medical students with the ability to cope with ethical issues they may encounter in their professional lives and to make ethical decisions. The place and importance of ethics education in medical curricula is indispensable for developing skills such as being aware of ethical issues and able to analyze complex ethical dilemmas. In psychiatry, ethics education seems to be quite important due to the fact that patients are in a vulnerable group, their decision-making capacities are reduced due to some mental health problems, due to issues such as the importance of boundaries and confidentiality-privacy in the patient-doctor relationship, the dilemmas between benefiting the patients and confidentiality or respecting autonomy and stigmatization. This article aims to emphasize the importance of ethics education in medical education, especially in undergraduate psychiatry education, from the perspective of both an academician and a medical student.

Keywords: Ethics, Psychiatry, Undergraduate Education

Etik Bilgiler Etik Kurul Onayı: Bu makale bir eitöre not yazısı olduğu için Etik Kurul Onayı alınmasına gerek yoktur.
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Çıkar Çatışması Bildirimi: Yazar çıkar çatışması olmadığını beyan etmiştir
Destek ve Teşekkür Beyanı: Yazar bu çalışma için finansal destek almadığını beyan etmiştir.

Özet: Tıp etiği eğitimi ile tıp öğrencilerinin meslek yaşamlarında karşılaşabilecekleri etik sorunlarla başa çıkabilme ve etik karar verme yeteneğinin kazandırılması hedeflenmektedir. Tıbbi müdahaleler sırasında karşılaşacakları etik sorunların farkında olma ve karmaşık etik ikilemleri analiz edebilme gibi becerilerin geliştirilmesi için, tıp müfredatında etik eğitiminin yeri ve önemi vazgeçilmezdir. Psikiyatride, hastaların savunmasız ve incinebilir grupta olması, bazı ruhsal sorunlar nedeniyle karar verme kapasitelerinde azalma görülmesi, hasta-hekim ilişkisinde sınırların ve gizlilik-mahremiyet gibi konuların önemi, bazı psikiyatrik uygulamalar ile hastanın yararını gözetme ile gizlilik ya da hasta özerkliğinin gözetilmesi arasındaki ikilemler yaşanması ve damgalanma gibi nedenlerle psikiyatride etik eğitimi oldukça önemli görünmektedir. Bu yazı ile tıp eğitiminde ve özellikle mezuniyet öncesi psikiyatri eğitiminde etik eğitiminin önemini hem akademisyen hem öğrenci gözünden vurgulamak amaçlanmaktadır.

Anahtar Kelimeler: Etik, Psikiyatri, Mezuniyet Öncesi Eğitim

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1. Giriş

Modern tıp eğitiminin önemli bir parçası olan olguların etik analizi ve tıp etiği eğitimi, tıp öğrencilerinin meslek yaşamlarında karşılaşabilecekleri yasal, ahlaki ve etik sorunlarla başa çıkabilme ve etik karar verme yeteneği kazandırmayı hedeflemektedir. Tıp etiği eğitiminin hedefi hekim-hasta ilişkisinin ahlaki temellerinin kavranması, tıbbi araştırma ve uygulamalarda hasta haklarının korunması, toplum sağlığının gözetilmesi gibi kazanımlardır. Hekimin tıbbi bir karar alırken, yalnızca tıbbi nedenlerle değil aynı zamanda uluslararası kabul görmüş etik ilke ve değerlere dayanarak karar verebilmesi gerekir. Tıbbi müdahaleler sırasında karşılaşabilecek etik sorunları belirlemek, karmaşık etik ikilemlerle başa çıkabilecek bilgi, beceri ve tutumları geliştirmek tıp etiği eğitiminin önemli konuları arasındadır. Bu şekilde ancak kişilerin hekimlik becerilerinin yanında mesleki ve ahlaki sorumlulukları konusunda bilinçli ve vicdanlı bireyler olmaları sağlanabilir. Tüm bu nedenlerle, tıp müfredatında etik eğitiminin yeri ve önemi vazgeçilmezdir1.

En etkili öğretim yöntemlerinden biri, küçük gruplar halinde yapılan disiplinlerarası ve vaka temelli öğretimdir. Bu yaklaşım, öğrencilerin etik problemleri analiz etmelerini teşvik ederken, çeşitli bakış açıları ve farklı ahlaki temellendirmeleri göz önüne alarak tartışmalar yapmalarını sağlayarak aktif bir öğrenme deneyimi sunar. Küçük grup çalışmaları, öğrencilerin daha fazla katılım göstermesine ve birbirleriyle etkileşim kurarak öğrenmelerine olanak tanır. Yine etik eğitiminde yaygın olarak kullanılan ve etik sorunları, mevcut vakanın öncesindeki benzer vakalarla analojiler kurarak çözmeyi içeren vakadangelim (casuistry) yöntemi ile öğrencilere paradigma vakaları konusunda bilgi vermeyi içerir. Paradigma vakası ile kıyaslama yaparak benzer etik sorunları içeren vakalar değerlendirilir. Tıp fakültelerinde verilen etik eğitimine baktığımızda, Türk Tabipler Birliği (TTB) tarafından hazırlanan Mezuniyet Öncesi Tıp Eğitimi Raporu-2010'da belirtildiği üzere Türkiye'de 2010 itibariyle 74 tıp fakültesi eğitim vermekte ve bunlar arasında sadece 33 tıp fakültesinde tıp etiği dersleri verilmektedir.

Mezuniyet öncesi psikiyatri eğitimi ile psikiyatrik belirti ve bulguları tanımak; sık görülen ruhsal hastalıkların birinci basamak düzeyinde tanısını koymak, tedavi etmek ya da uygun tedavi basamaklarına yönlendirmek; acil psikiyatrik durumlarda ilk müdahaleyi yapmak ve uygun koşullarda hastayı sevk etmek; ruhsal hastalıklardan korunma önlemlerini uygulamak ve toplumu eğitmek, psikiyatrik belirtilerle ilgili olabilecek diğer tıbbi durumların ayırıcı tanısını yapabilmek, ön tanısını koymak ve uygun branşlara sevk etmek için öğrencilere gerekli bilgi, beceri ve tutumları kazandırmaktır.2 Temel bilgi ve becerilere sahip hekimlerin yetişebilmesi için çerçeve bir program hazırlanması gereksinimi ile 2000'li yılların başında tıp fakültelerinin katkıları ile UÇEP (Ulusal Çekirdek Eğitim Programı) hazırlanmış, en son 2020 yılında revize edilmiştir. Fakültelerin müfredatlarında UÇEP'i temel alması beklenmektedir. Program değerlendirildiğinde dolaylı olarak psikiyatri etiğini ilgilendiren bazı konular yer almakla birlikte psikiyatri etiği ile ilgili detaylı bir başlık yer almamaktadır. Psikiyatrinin kendine özgü doğası, hastaların savunmasız ve incinebilir grupta olması, hastaların bazı ruhsal sorunlar nedeniyle karar verme kapasitelerinde azalma görülmesi, hasta-hekim ilişkisinde sınırların ve gizlilik-mahremiyet gibi konuların önemi, bazı psikiyatrik uygulamalar ile hastanın yararını gözetme ile gizlilik ya da hasta özerkliğinin gözetilmesi arasındaki ikilemler yaşanması, damgalanma gibi nedenlerle psikiyatride etik eğitimi oldukça önemli görünmektedir.3 Psikiyatrinin tıp içindeki özgün konumu düşünüldüğünde, kısaca da olsa bu konudaki eğitimin yalnızca psikiyatri etiğiyle sınırlı bir farkındalık sağlamayacağı, hekimlerin genel tıp etiği farkındalığını artıracağı da düşünülebilir. Ancak tıp fakültelerinde psikiyatri stajlarında psikiyatri etiği eğitiminin yeterliliği ve yoğunluğu tartışmaya açıktır.

Psikiyatri eğitiminin geleceği ile ilgili dünyaya baktığımızda, artan küresel göç nedeniyle kültürel

psikiyatri, alandaki ilerlemeler ile sinirbilim ve teknolojinin gelişimi ile simülasyona dayalı eğitim, tıp eğitiminde oyun, telepsikiyatri uygulamaları gündeme gelirken, psikiyatri uygulamalarında etik sorunların farklı boyutlar kazanacağı düşünülmektedir; bu nedenle psikiyatride etik eğitiminin de kendini sürekli güncellemesi uygun olacaktır. Türkiye Psikiyatri Derneği'nin özellikle asistanlık ve uzmanlık eğitimi de dahil olmak üzere etik eğitimini ve etik kodları geliştirmek üzere yaptığı çalışmalar dikkate değerdir. Psikiyatride etik yaklaşımlar ve akıl hastalıklarında damgalamayla mücadele gibi konuların öğretilmesini zaruri gördüğümüz için tıp eğitiminin temel bir parçası olarak psikiyatri etiğinin/psikiyatri etiği eğitiminin çekirdek eğitim programına dahil edilmesi gerektiğini ve bu nedenle tıp fakültesi eğitim programlarının ve psikiyatri stajı müfredatının gözden geçirilmesi gerektiğini düşünmekteyiz.

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