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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

The Relationship between Playing Video Games and Sleeping Habits in Primary School Children

İlkokul Çağındaki Çocukların Video Oyunları Oynaması ile Uyku Alışkanlıkları Arasındaki İlişki

Betül Orhan Kılıç[1], Dilek Konuksever[2]

[1]Baskent University Faculty of Medicine, Department of Pediatrics, Ankara, Turkey
[2]Ankara Bilkent City Hospital, Department of Pediatrics, Ankara, Turkey

ABSTRACT

Aim: Sleep plays a crucial role in maintaining children's overall health. This study aimed to investigate the association between primary school children's video game playing habits and their sleep patterns.

Material and Method: The study included healthy children aged 6-10 years, without any chronic illnesses, who visited the Pediatric Polyclinic at Baskent University for routine check-ups for three months during the summer. Parents and children completed an online questionnaire that assessed sociodemographic information, video game playing characteristics, and the Children's Sleep Habits Questionnaire (CSHQ).

Results: A total of 141 children participated in the study, with 56% being girls. The mean age of the participants was 9.0±1.1 years. Among the children, 75.9% (n=107) reported playing video game, with 21.4% (n=23) playing for more than 3 hours per day. Significant differences were observed in the sleep habits of children based on their video game playing status (p<0.001). Specifically, 94.4% of video game players exhibited impaired sleep habits (CSHQ score above 41 points), while only 25.3% of non-players fell into this category (p<0.001). Furthermore, when analyzing the total scores and subgroup scores of the Children's Sleep Habits Questionnaire (CSHQ) based on children's video game playing time, statistically significant differences were found in the subgroups of total sleep score, night waking, sleep-disordered breathing, and daytime sleepiness (p<0.001, p=0.015, p=0.010, p<0.001).

Conclusion: This study highlights a relationship between video game playing habits and disrupted sleep patterns in primary school children. Further research with larger sample sizes is needed to strengthen these findings. Comprehensive pediatric check-ups should be viewed as an opportunity for a holistic assessment of children's well-being.

Keywords: Child, sleep habits, video games

ÖZ

Amaç: Uyku, çocukların genel sağlığının korunmasında önemli bir rol oynamaktadır. Bu çalışmanın amacı, ilkokul çocuklarının video oyunu oynama alışkanlıkları ile uyku düzenleri arasındaki ilişkiyi araştırmaktır.

Gereç ve Yöntem: Çalışmaya, yaz aylarında üç ay boyunca rutin kontroller için Başkent Üniversitesi Pediatri Polikliniğine gelen, herhangi bir kronik hastalığı olmayan 6-10 yaş arası sağlıklı çocuklar dahil edildi. Ebeveynler ve çocuklar sosyodemografik bilgileri, video oyunu oynama özelliklerini ve Çocuk Uyku Alışkanlıkları Anketi'ni (ÇUAA) içeren çevrim içi bir anket doldurdu.

Bulgular: Çalışmaya %56'sı kız olmak üzere toplam 141 çocuk katılmıştır. Katılımcıların yaş ortalaması 9.0±1.1 yıldı. Çocukların %75,9'u (n=107) video oyunu oynadığını ve %21,4'ü (n=23) günde 3 saatten fazla oynadığını bildirdi. Video oyunu oynama durumlarına göre çocukların uyku alışkanlıklarında anlamlı farklılıklar gözlenmiştir (p<0.001). Özellikle, video oyunu oynayanların %94,4'ü bozulmuş uyku alışkanlıkları sergilerken (ÇUAA puanı 41 puanın üzerinde), oynamayanların sadece %25,3'ü bu kategoriye girmiştir (p<0,001). Ayrıca, Çocukların Uyku Alışkanlıkları Anketi'nin (ÇUAA) toplam puanları ve alt grup puanları çocukların video oyunu oynama süresine göre analiz edildiğinde, toplam uyku puanı, gece uyanma, uykuda solunum bozukluğu ve gündüz uykululuk alt gruplarında istatistiksel olarak anlamlı farklılıklar bulunmuştur (p<0.001, p=0.015, p=0.010, p<0.001).

Sonuç: Bu çalışma, ilkokul çocuklarında video oyunu oynama alışkanlıkları ile uyku düzeninin bozulması arasında bir ilişki olduğunu vurgulamaktadır. Bu bulguları güçlendirmek için daha geniş örneklemli ileri araştırmalara ihtiyaç vardır. Kapsamlı pediatrik kontroller, çocukların refahının bütüncül bir şekilde değerlendirilmesi için bir fırsat olarak görülmelidir.

Anahtar Kelimeler: Çocuk, uyku alışkanlıkları, video oyunları

Corresponding Author: Betül ORHAN KILIÇ
Address: Yukari Bahcelievler, Maresal Fevzi Cakmak cad. No:45, 06490 Cankaya Ankara TURKEY
E-mail: betulorhandr@hotmail.com

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INTRODUCTION

Sleep plays a vital role in the overall well-being and development of children, and their sleep habits can significantly impact their physical and cognitive functioning. In recent years, the increasing popularity of video games among children has raised concerns about its potential effects on various aspects of their lives, including sleep patterns (1-3).

According to the Survey on Information and Communication Technology Usage by Children, 2021, 36.0% of children reported engaging in digital game playing (4). Further analysis of this proportion reveals that among children aged 6-10, 32.7% were found to be playing digital games. Similarly, among children aged 11-15, the percentage of digital game players was slightly higher at 39.4%. These findings indicate that a significant portion of children in our country actively participate in video game playing, with variations observed across different age groups. The widespread use of video games among children raises concerns about its potential negative impact on sleep habits. In today's digital age, children are increasingly exposed to video games, which can disrupt their sleep patterns and lead to sleep deprivation (5,6). Furthermore, the addictive nature of video games can contribute to a pattern of late-night gaming sessions, where children find themselves staying up well past their bedtime to continue playing. This can result in a chronic sleep deficit, leading to daytime sleepiness, difficulty concentrating, and impaired cognitive functioning (1,7). Moreover, the use of electronic devices, including video game consoles, in the bedroom might disrupt the sleep environment by emitting blue light, which suppresses the production of melatonin and makes it harder for children to fall asleep. The constant exposure to screens can also contribute to a heightened state of arousal, making it more challenging for children to relax and achieve restful sleep.

There was limited research specifically focusing on the primary school age group, warranting further investigation. Examining the association between video game playing and sleep habits in primary school children can provide valuable insights into potential concerns and inform interventions aimed at promoting healthy sleep behaviors. The objective of this study is to investigate the relationship between video game playing and sleeping habits in primary school children. By assessing the duration and frequency of VG playing and evaluating various aspects of sleep quality, such as bedtime resistance, sleep onset delay, sleep duration, and presence of parasomnias, we aim to explore potential associations and identify any detrimental effects of video game exposure on sleep patterns.

MATERIAL AND METHOD

The study was carried out with the permission of the Baskent University Ethics Committee (Date: 2023, Decision No: KA23/343). The study adhered to the ethical guidelines and principles set forth in the Declaration of Helsinki, ensuring the protection of participants' rights and welfare.

The study aimed to include children aged 6 to 10 years who attended primary school and visited our outpatient clinic for routine well child check-ups. The inclusion criteria required that participants did not have any chronic diseases. Participants and parents were provided with detailed information about the study's purpose, procedures, potential risks and benefits, confidentiality measures, and their right to withdraw at any time without penalty. They were given ample time to ask questions and fully understand the nature of their participation before providing their consent.

The informed consent process aimed to ensure voluntary participation and respect for autonomy, emphasizing the importance of informed decision-making based on a comprehensive understanding of the study's objectives and requirements. Consent forms were signed by the participants and their parents/legal guardians to signify their agreement to participate in the study.

To collect data from the participating families, online questionnaire forms were utilized. Families who expressed their willingness to be included in the study were provided with the questionnaires, which were distributed via email using the Google Forms platform.

Measures

The online questionnaire form was developed by incorporating various aspects, including the sociodemographic characteristics of the families (such as parental age, education level, marital status, and income status), the age and gender of the child, the specific attributes related to their video game usage, and the "Sleep Habits Questionnaire for Children". The design of the questionnaire aimed to capture a comprehensive range of information relevant to the study's objectives. It encompassed sociodemographic variables to better understand the background of the families, as well as the child's age and gender to analyze potential age and gender differences in video game habits and sleep patterns.

Children's Video Game Playing Status and Duration

Both parents and children were asked about the frequency and duration of the children's video game playing. The children's video game playing time per day was assessed using the following response options: "I never play," "Less than 1 hour," "1-2 hours," "2-3 hours," "3-4 hours," and "Over 4 hours."

Sleep Habits

This current study used the "Children Sleep Habits Questionnaire" (CSHQ) to assess various aspects of the child's sleep habits. Originally developed by Owens et al. in 2000, the CSHQ was designed to explore sleep-related issues in preschool and school-aged children, focusing on identifying high-risk situations rather than diagnosing specific sleep disorders (8). In 2010, Fis et al. adapted the CSHQ to the Turkish language, conducting a validity and reliability study that yielded a Cronbach's alpha value of 0.78 (9). Parents participated by retrospectively completing the questionnaire, providing an assessment of their child's sleep habits during the preceding week. The CSHQ comprises eight subscales, encompassing various aspects of sleep, such as bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep-disordered breathing, and daytime sleepiness. Using the scores obtained from the Sleep Habits Questionnaire, we categorized the children into two groups: Sleep Group I (≤ 41 points) and Sleep Group II (> 41 points). The results of our study revealed that 64.6% (n=62) of the children fell into Sleep Group II. In our study, the Cronbach's alpha coefficient for the scale was determined to be 0.75, indicating a satisfactory level of internal consistency.

Statistical analysis

Descriptive statistics were used to summarize the data, with numbers and percentages reported for categorical variables and mean±standard deviation and median (minimum-maximum) reported for continuous variables. The Chi-square test was used to analyze associations between categorical variables. Nonparametric tests were utilized due to the non-normal distribution of sample data across groups. Specifically, the Mann Whitney U test was used to compare quantitative variables between the playing video gaming and non- playing video games. Statistical significance was determined by a p-value of <0.05. Data analysis was conducted using the IBM SPSS version 28.0 software for Windows (IBM Corp; Armonk, NY: 2021). There was no plagiarism or copying of any previous work.

RESULTS

In our study, a total of 141 children participated, with a mean age of 9.0±1.1. The mothers of the children had a mean age of 40.2±5.3, while the fathers had a mean age of 43.0±5.4. Among the participants, 56% (n=79) were female. **Table 1** presents descriptive data on parents' and children's sociodemographic characteristics, as well as children's video playback characteristics and sleep habits. The current study found that 75.9% (n=107) of the participating children played digital video games. Among those who played video games, 53.2% reported playing for less than 1 hour, 18.6% played for 1-2 hours, 6.5% played for 2-3 hours, 14.9% played for 3-4 hours, and 6.5% played for over 4 hours. The mean score of the Children's Sleep Habits Questionnaire (CSHQ) was 46.7±6.0, the majority of children (80.1%) had impaired sleep habits.

Table 1. Descriptive datas of the children and their parents.

Parents' characteristics	
Mean age of the parents (M±SD)	
Mothers	40.2±5.3
Fathers	43.0±5.4
Martial status n(%)	
Married	132 (93.6)
Divorced	9 (6.4)
Monthl income level n(%)	
≤ 2 MW	26 (18.4)
>2xMW	115 (81.6)
Educational level n(%)	
Fathers	
High school and below	31 (22.0)
License and graduate	110 (78.0)
Mothers	
High school and below	33 (23.4)
License and graduate	108 (76.6)
Children's characteristics	
Mean age of the Children (M±SD)	9.0±1.1
Gender n(%)	
Male	62 (44.0)
Female	79 (56.0)
Playing video game status	
Yes	107 (75.9)
No	34 (24.1)
Playing Video Games Duration	
<1 hour	57 (53.2)
1-2 hours	19 (18.6)
2-3 hours	8 (6.5)
3-4 hours	15 (14.9)
>4 hours	8 (6.5)
Total Score of the CSHQ	46.7± 6.0
Sleep Habits n(%)	
Normal (CSHQ score <41 points	28 (19.9)
Impaired sleep habits (CSHQ score≥41 points)	113 (80.1)

Minimum wage: (MW), CSHQ: The Children's Sleep Habits Questionnaire, M: mean, SD: standard deviation. n:number

Table 2 presents children's sociodemographic characteristics and sleep habits based on their video game-playing status. Gender and age distributions were similar between children who played video games and those who did not (p=0.439, p=0.118), indicating no statistically significant differences in these factors. However, when comparing the sociodemographic characteristics of parents based on their children's video game playing status, significant differences were observed in parental marital status, family income, and father's educational status (p=0.002, p=0.013, p=0.035). The families of children who played video games had a higher rate of being married (97.2%) compared to those whose children did not play (82.3%). Additionally, 85% of families with video game-playing children had a monthly income higher than twice the minimum wage, while this rate was 70.6% for non-players. Furthermore, 82.3% of fathers of video game players had a lisence or postgraduate education, whereas 64.7% of non-players' fathers had similar educational backgrounds.

Table 2. Sociodemographic Characteristics of Children and Parents, and Children's Sleep Habits According to Video Game Playing Status.

	Children's video gaming status		
	No	Yes	p values
Mean age of the parents (M±SD) (years)			
Mothers	41.4±4.5	39.8±5.5	0.076
Fathers	43.7 ±5.1	42.7±5.4	0.318
Martial status n(%)			
Married	28(82.3)	104 (97.2)	0.002
Divorced	6(17.7)	3 (2.8)	
Monthl income level n(%)			
≤ 2 MW	10(29.4)	16 (15.0)	0.013
>2xMW	24 (70.6)	91 (85.0)	
Educational level n(%)			
Fathers			
High school and below	12(35.3)	19 (17.7)	0.035
License and graduate	22(64.7)	88 (82.3)	
Mothers			
High school and below	12 (35.3)	21 (19.6)	0.069
License and graduate	22(64.4)	86 (81.4)	
Mean age of the Children (M±SD)	9 .0 ±2.0	9.1±1.8	0.118
Gender (children) n(%)			
Male	13 (38.2)	49 (45.8)	0.439
Female	21 (61.8)	58 (54.2)	
Total Score of the CSHQ	41.9± 5.9	48.2±5.5	<0.001
Sleep Habits n(%)			
Normal (CSHQ score <41 points	22 (64.7)	6 (5.6)	<0.001
Impaired sleep habits (CSHQ score≥41 points)	12 (35.3)	101 (94.4)	

Minimum wage: (MW), CSHQ: The Children's Sleep Habits Questionnaire, M: mean, SD: standard deviation. n:number

A statistically significant difference was found in the sleep habits of children based on their video game playing status (p<0.001). The mean score on the Children's Sleep Habits Questionnaire (CSHQ) was higher among video game players (48.2±5.5) compared to non-players (41.9±5.9), indicating poorer sleep quality among the former. Moreover, there was a significant difference in the rates of impaired sleep habits between video game players and non-players (p<0.001). Specifically, 94.4% of video game players had impaired sleep habits (CSHQ score above 41 points), while 25.3% of non-players fell into this category.

When examining the total Children's Sleep Habits Questionnaire (CSHQ) scores and subgroup scores based on children's video game playing time, statistically significant differences were found in the subgroups of total sleep score, night waking, sleep-disordered breathing, and daytime sleepiness (p<0.001, p=0.015, p=0.010, p<0.001) (See in Figure). No statistically significant differences were observed in the other subgroups of the CSHQ based on children's video game playing time (p>0.05) (**Figure**).

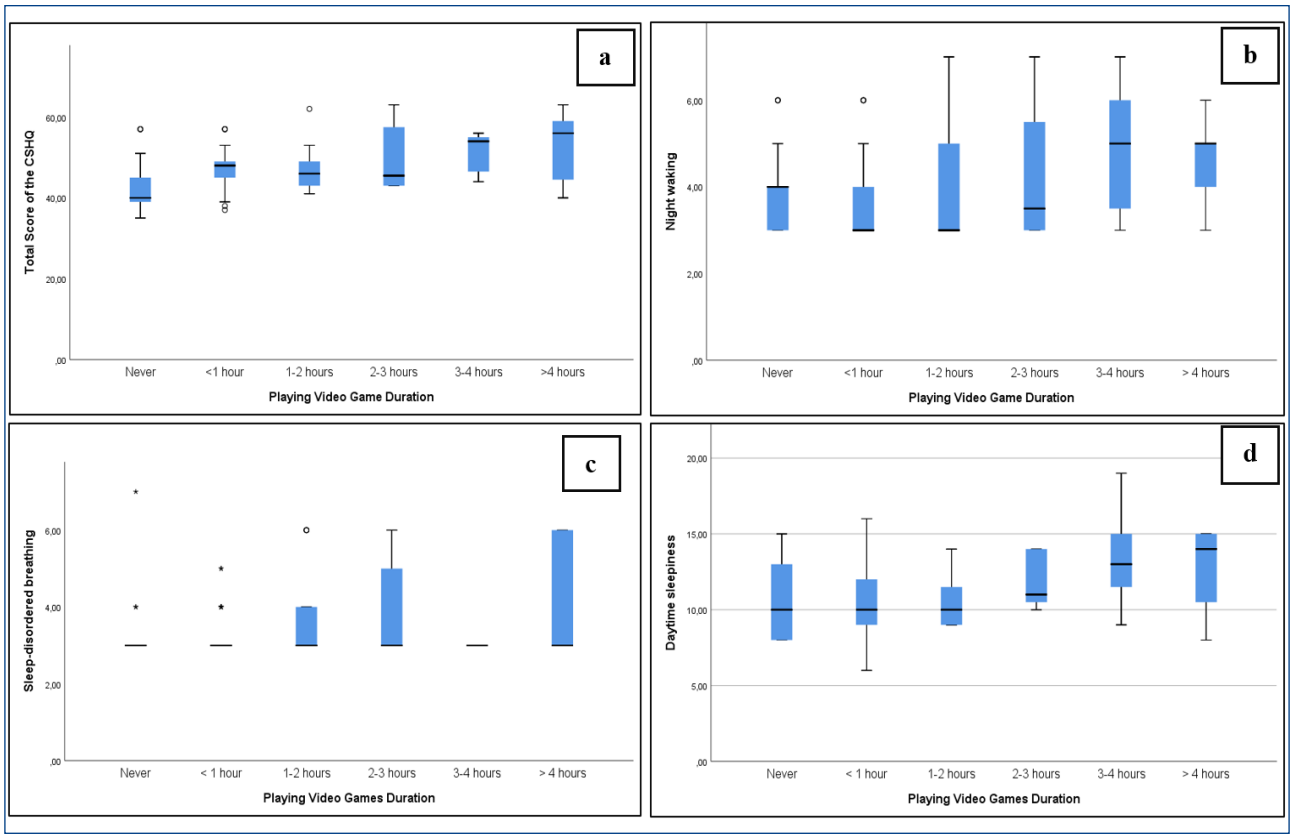

Figure. Children's Sleep Habits, Night waking, Sleep-disordered breathing, and Daytime sleepiness status by Video Game Playing Duration
a: There was a statistically significant difference in total "CSHO" scores among children based on playing game duration (p<0.001).
b. There was a statistically significant difference in total "night awaking" subgroups' scores among children based on playing game duration (p=0.015).
c: There was a statistically significant difference in total "sleep disorded breathing" subgroups' scores among children based on playing game duration (p=0.010).
d. There was a statistically significant difference in total "daytime sleepiness" subgroups' scores among children based on playing game duration (p<0.001).

DISCUSSION

The public's concern regarding the potential effects of video game exposure on children's well-being has been steadily increasing, and scientific literature has provided evidence of negative outcomes across various domains of human health. However, one critical aspect that has received relatively less attention is the direct impact of video game exposure on sleep quality. This study aimed to address this gap by comparing parental sociodemographic characteristics and sleep habits of children who play video games with those who do not. The findings of this research highlight the association between video game playing and impaired sleep habits among children.

The current study highlights the widespread prevalence of video game playing among the participating children, with 75.9% of them engaging in digital video games. Among those who reported playing video games, approximately 50% played for less than 1 hour per day, indicating moderate or controlled exposure to gaming. However, the presence of a significant proportion (21.4%) playing for 3 hours or more raises concerns about potential excessive video game use. In our study, no significant differences were found in terms of gender and age between children who played video games and those who did not. Comparing our findings with the Survey on Information and Communication Technology Usage by Children in our country in 2021, we observed similar patterns in terms of average game-playing durations (4). Boys reported spending more time playing digital games than girls, both on weekdays and weekends. However, it is important to note that the survey indicated a lower overall proportion (36.0%) of children playing digital games compared to our study. These findings align with the growing body of research in Western industrialized societies, which indicates that a significant number of children and adolescents dedicate extensive amounts of time to playing video games (10,11). Considering the potential risks associated with excessive video game use, such as negative impacts on sleep, physical health, and academic performance, it is essential to promote responsible and balanced gaming habits. Educating children, parents, educators, and policymakers about appropriate screen time limits and the potential benefits and risks of video game playing can contribute to fostering healthy gaming behaviors.

Our study contributes to the existing body of evidence on the relationship between video game playing and sleep habits in children. We found a statistically significant difference in sleep habits based on video game playing status, with video game players exhibiting more frequently impaired sleep habits compared to non-players. This aligns with previous research that has shown excessive video game use to disrupt sleep patterns and negatively impact sleep duration. For instance, a study conducted in the greater Montreal area reported that more than 2 hours of daily video game use was associated with reduced sleep duration (12). Similarly, a study on U.S. adolescents found that video game use was correlated with shorter sleep duration and an increased risk of insufficient sleep (13). However, it is worth noting that there are some contradictory findings as well. An investigation by Arrona-Palacios demonstrated that adolescents with high exposure to video games during nighttime did not show significant differences in their sleep-wake cycle compared to those with lower exposure (14). These findings collectively emphasize the importance of promoting healthy screen time habits and ensuring adequate sleep for children's overall well-being and development while acknowledging that further research is needed to fully understand the complex relationship between video game playing and sleep habits among children.

In our study, we also examined the sociodemographic characteristics of parents in relation to their children's video game-playing status. Significant differences were observed in parental marital status, family income, and father's educational status. Families of children who played video games had a higher rate of being married compared to those whose children did not play. This finding suggests that video game playing may be more prevalent in households with married parents. Additionally, families with video game-playing children had a higher monthly income compared to non-players, indicating a possible association between higher socioeconomic status and video game use. Moreover, fathers of video game players were more likely to have a higher level of education compared to non-players fathers. These sociodemographic differences provide important context to our findings and suggest that factors such as family structure, income, and parental education may influence video game-playing habits in children. Further research is needed to explore these relationships and their potential impact on children's sleep habits and overall well-being.

The results of our study revealed that children who play video games are more likely to exhibit impaired sleep habits compared to their non-playing counterparts. This finding is consistent with previous studies that have reported similar associations between playing video games time and sleep disturbances (1,15,16). The detrimental effects of video game playing on sleep can be attributed to several factors. First, the stimulating nature of video games, particularly those with intense graphics and fast-paced gameplay, can lead to increased arousal and difficulty in winding down before bedtime. Additionally, the interactive and engaging nature of video games may contribute to delayed sleep onset and longer periods of night waking. Moreover, the potential

exposure to bright screens and blue light emitted by electronic devices can disrupt the natural sleep-wake cycle by suppressing the release of melatonin, a hormone involved in regulating sleep.

Overall, our study underscores the importance of considering the potential impact of video game playing on sleep habits among children. The findings highlight the need for further research and public awareness regarding the potential risks associated with excessive video game exposure, particularly in terms of sleep quality. It is crucial for parents, healthcare professionals, and policymakers to promote healthy screen time habits and establish guidelines to ensure adequate sleep for children. Future interventions and educational programs should target both parents and children to raise awareness about the potential negative effects of video game playing on sleep and provide practical strategies for maintaining a healthy balance between gaming and sleep.

Despite the valuable findings in our study, it is essential to acknowledge several limitations. Firstly, our research sample consisted of children who sought care at a university hospital and their parents, which may limit the generalizability of the results to broader populations. Therefore, comprehensive multicenter studies involving diverse populations are necessary to validate and expand upon our findings. Additionally, the high prevalence of sleep disturbances observed in our study sample suggests that other factors beyond video game playing may contribute to sleep habits in children. Further investigations should explore these potential factors to gain a more comprehensive understanding of the complex nature of sleep habits in children. Another limitation of our study is that it was conducted during the summer vacation when children's schools were closed, potentially leading to a relative decrease in their study hours. Conducting more comprehensive studies that encompass both summer and winter periods would be beneficial for a more holistic understanding. Despite these limitations, we believe that our research provides important insights and can serve as a foundation for future studies in this field.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of the Baskent University Ethics Committee (Date: 2023, Decision No: KA23/343).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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