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Evaluation of life quality and sleep problems in children presenting with headache to the pediatric neurology outpatient clinic

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ABSTRACT

Aim: We aimed to investigate the quality of life (QL) and sleep habits (SH) of children presenting to the pediatric neurology outpatient clinic with headache.

Methods: This prospective, cross-sectional and observational survey study included children aged 2-18 who presented to the pediatric neurology outpatient clinics of Dr. Ali Kemal Belviranlı Maternity and Children's Hospital or Konya City Hospital between April and August 2022. QL was assessed using the Pediatric Quality of Life Inventory (PedsQL) and sleep characteristics were evaluated using the Children's Sleep Habits Questionnaire.

Results: The study included 137 patients (56.2% girls) with a mean age of 153.54±34.5 months at presentation. All patients were diagnosed with primary headache; 51.8% had migraine and 48.2% had tension-type headache. Quality of life scores were 69.07±14.96 according to child self-assessment and 66.39±15.37 according to parental assessment. The mean score on the sleep habits questionnaire was 48.01±7.68, and 9.5% of the patients had good sleep quality. Subscale scores showed that the greatest adverse effects on QL were in the areas of emotional functioning and school functioning.

Conclusions: Clinical assessment of patients' QL and SH is important for individualizing treatment and approach in pediatric primary headache.

Key words: Pediatric primary headache, pediatric neurology outpatient, quality of life, sleep.

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Introduction

Headache is an extensive complaint in the children, is among the leading causes of admission to pediatric neurology outpatient clinics [1-3]. The prevalence of headache has been reported as 37-82% in children [1]. Despite its frequency, it is often ignored because it is episodic and not life-threatening. However, chronic and recurrent headaches can seriously impair quality of life (QL) and adversely affect the person's education, family, and professional life. It has been suggested that chronic and recurrent headaches may be an indicator of stressors in a person's life and strain on their social, emotional, and cognitive skills [4].

Primary headaches are those that are not associated with a cause such as toxic or infectious pathologies, malignancy, hydrocephalus, or pseudotumor cerebri [1, 5]. The relationship between headache and sleep is an important issue for primary headache,

especially in childhood. The pathophysiology of headache and its relationship with sleep is complex. Alterations in hypothalamic activation and networks are involved in headache pathophysiology and impaired sleep cycle mechanisms. Orexin and melatonin are also important mediators in the relationship and pathophysiology of sleep and headache [6]. In a study of 622 children with pain, 60% of whom had headache, the most common complaints were sleep problems (53.6%) [7]. We purposed to investigate QL and sleep habits (SH) in children presenting with headache, which is an extensive problem in pediatric neurology outpatient clinics and identify their support needs in this study.

Materials and metods

This observational, prospective, cross-sectional survey aimed to determine to what degree and in which domains (physical, emotional, psychosocial, school) QL is affected in children with headache. We also aimed to identify these patients' SH (e.g., daytime sleepiness, sleep-disordered breathing, parasomnia, frequent night awakenings, sleep anxiety, sleep duration, delayed sleep onset, bedtime resistance) and determine the areas in which these patients need support from healthcare services (physical, emotional, psychosocial, school- and/or sleep-related). QL was evaluated using the Pediatric Quality of Life Inventory (PedsQL) and SH with the Children's Sleep Habits Questionnaire (CSHQ) [8-13].

The study included boys and girls who presented at age 2-18 years with complaints of headache to the pediatric neurology outpatient clinics of Dr. Ali Kemal Belviranlı Maternity and Children's Hospital or Konya City Hospital between April and August 2022. The patients' current age, complaint duration (since first onset), age at first presentation, sex, headache features (frequency and duration of episodes, triggers [e.g., light, sound], time of onset, type, location), daily media use, and physical examination findings were obtained from patient records and recorded in the patient follow-up form.

Patients, who with a complaint of headache Dr. Ali Kemal Belviranlı Obstetrics and Pediatrics Hospital or Konya City Hospital pediatric neurology outpatient clinic between the ages of 2-18, with normal mental and motor functions, without autism and psychotic disorder diagnoses, without additional chronic systemic disease other than headache, given informed consent from their guardian and/or self, and whose hospital records could be accessed to complete file information, were included in the study.

Patients, who did not meet the criteria for inclusion in the study, who and/or their parents/guardians did not want to participate in the study, who were diagnosed with another systemic chronic disease at least 1 year ago, and whose hospital records could not access sufficient file information were excluded from the study.

Data collection

The patient follow-up form prepared by the researchers was completed by the researchers for all children participating in the study, while the PedsQL child form was administered to all literate children over 5 years of age, and the parents completed the PedsQL parent form and the CSHQ.

Statistical analysis

Data were analyzed using IBM SPSS Statistics version 23. The Kolmogorov-Smirnov test was used to assess the normality of data distributions. Differences in the distribution of headache types according to categorical variables were analyzed using Pearson's chi-square test

Table 1. Clinical and demographic properties of the patients**.**

Parameters	**Number (n)**	**Percentage (%)**
Age Group		
5-7 years	11	8
8-12 years	35	25.5
13-18 years	91	66.4
Sex		
Female	77	56.2
Male	60	43.8
Daily Media Use		
<1 hour	50	36.5
>1 hour	87	63.5
Need for Painkillers		
Yes	100	73
No	37	27
Headache-Related School Absence		
Yes	44	32.1
No	93	67.9
Headache Type		
Migraine	71	51.8
Tension-type	66	48.2
Complaint Duration		
≤ 1 month	10	7.3
1-6 months	35	25.5
≥ 6 months	92	67.2
Headache Frequency		
≤ 1/day	49	35.8
1/day - 1/week	65	47.4
> 1/week	23	16.8
Light Triggering		
Yes	85	62
No	52	38
Sound Triggering		
Yes	89	65
No	48	35
Headache Onset Time		
Morning	12	8.8
Afternoon	119	86.9
Evening	6	4.4
Brain MRI		
Normal	112	81.8
Nonspecific abnormality (Arachnoid cyst, nonspecific white matter changes, cerebellar tonsillar herniation)	11	8
Not obtained	14	10.2

with Bonferroni correction for multiple comparisons. Results were presented as frequency (percentage) for categorical variables and as mean ± standard deviation and median (range) for quantitative variables. Level of significance was accepted as p<0.050.

Ethical approval

All study procedures were performed in accordance with the ethical standards of the 1964 Declaration of Helsinki and its later amendments. Ethics committee approval was received for the study [date: 01.04.2022, meeting number: 151, decision number: 2022/3732: (9405)]. Informed consent was obtained from the parents of the children participating in the study and, when appropriate, assent as obtained from the children themselves.

Results

This study included a total of 137 children and adolescents (77 girls, 56.2%). The mean complaint duration was 15.63±18.37 months. All patients were diagnosed as having primary headache, 71 (51.8%) with migraine and 66 (48.2%) with tension-type headaches. The mean age at presentation was 153.54±34.5 months, with 8% of patients in the 5-7 years age group, 25.5% in the 8-12 years age group, and 66.4% in the 13-18 years age group. The mean duration of headache episodes was 9.35±8.71 hours. The exhaustive clinical and demographic properties of the patients are presented in Table 1.

Total PedsQL scores were 69.07±14.96 according to the children's self-assessment and 66.39±15.37 according to parental assessment. The mean CSHQ score was 48.01±7.68, and 90.5% of the children had poor sleep quality (total score > 41). The patients' QL and SH scores are presented in Table 2.

There was a statistically significant difference in the distribution of headache type according to age group (p=0.008). This difference was found to be between the 5-7 years and 13-18 years age group. The prevalence rates of migraine and tension-type headaches in children aged 5-7 years were 9.1% and 90.9%, respectively, while in adolescents aged 13-18 these rates were 58.2% and 41.8% (Table 3).

There was no statistically significant difference in the distribution of headache types according to sex (p=0.178). The prevalence of migraine was 46.8% in girls and 58.3% in boys. The prevalence of tension-type headache was 53.2% in girls and 41.7% in boys (Table 4).

Table 2. The patients' QL and SH scores.

QL	**Scores (mean ± SD)**
I) Child Self-Assessment	
Total Scale Score	69.07 ± 14.96
Physical Health	61.68 ± 21.04
Psychosocial Health	69.3 ± 14.64
School Functioning	53.14 ± 24.9
Social	66.82 ± 32.28
Emotional	54.42 ± 21.69
II) Parental Assessment	
Total Scale Score	66.39 ± 15.37
Physical Health	65.72 ± 18.34
Psychosocial Health	66.22 ± 18.08
School Functioning	62.74 ± 18.45
Social	74.96 ± 20.77
Emotional	61.46 ± 19.96
Sleep Habits	
Duration of Night Awakenings (min)	11.17 ± 14
Total Sleep Time (hours)	8.14 ± 1.17
Total Sleep Score	48.01 ± 7.68
Daytime Sleepiness	12.62 ± 2.72
Sleep-Disordered Breathing	3.78 ± 1.33
Parasomnias	9.04 ± 0
Night Awakenings	4.28 ± 1.39
Sleep Anxiety	5.13 ± 1.8
Sleep Duration	4.69 ± 1.76
Delayed Sleep Onset	1.52 ± 0.72
Bedtime Resistance	7.96 ± 2.39
Sleep quality status	
Good quality (≤41), n (%)	13 (9.5)
Poor quality (>41), n (%)	124 (90.5)

Table 3. Distribution of headache type by patient age group.

Parameters	Patient age group			Total	Test Stat.	*p**
	5-7 years**	8-12 years	13-18 years**			
Headache Type						
Migraine	1 (9.1)	17 (48.6)	53 (58.2)	71 (51.8)	9.695	**0.008**
Tension-type	10 (90.9)	18 (51.4)	38 (41.8)	66 (48.2)		

**Pearson's chi-square test; frequency (percentage); **Significant difference between the groups.*

Table 4. Distribution of headache type by patient sex.

Parameters	Sex		Total	Test Stat.	*p**
	Female	Male			
Headache Type					
Migraine	36 (46.8)	35 (58.3)	71 (51.8)	1.811	0.178
Tension-type	41 (53.2)	25 (41.7)	66 (48.2)		

**Pearson's chi-square test; frequency (percent).*

Discussion

This investigation was conducted in two different hospitals in Konya including a total of 137 children with primary headache who had a mean age of 153.54±34.5 months (66.4% aged 13-18 years), showed a slight female preponderance (56.2%) consistent with the literature, and were found to have migraine and tension-type headaches at rates of 51.8% and 48.2%, respectively [14]. In the cited review, some studies reported a higher prevalence of migraine while other reported a higher prevalence of tension headache. The similar rates of migraine and tension headache (with migraine being more common) seen in the study are compatible with the literature [14].

The mean duration of patients' headache episodes was 9.35±8.71 hours, which is longer than reported in the literature [15]. According to self-report, the rate of school absenteeism due to headache was 32.1%. A previous study reported that 1% of all missed school days were caused by headaches, 3.7% of children in school were absent one or more times because of headaches [16]. In their study of adolescents, Linet et al. [17] found that within the 4 weeks prior to being interviewed, 2% of adolescents had missed an entire school day and 9% had missed a part of a day. We believe the higher rate of headache-related absenteeism and longer duration of headache episodes in our study compared to the literature are associated with the greater headache severity in our patients [15-17].

It has been reported in the literature that headache and negative psychological outcomes are higher in adolescents with problematic internet use, and that more than 2 hours of electronic screen exposure in particular is associated with complaints of headache [18-20]. We also found that a most of our patients (63.5%) used digital media for more than 1 hour per day. This finding suggests that 1 hour can be considered a cut-off point and it may be beneficial to limit media use to 1 hour, especially in patients with headache.

Of the children in the study, 73% needed painkillers for headache, 83.2% said they had

headaches more than once a week, and headaches were reported to be triggered by sound in 65% and by light in 62% of the patients. In the literature, sound/noise has been reported as the most common headache trigger (42%) [21]. More severe headache episodes in our patients may also explain the higher need for painkillers in our study compared to the literature, which reported the need for painkillers in approximately half of patients with headache [15, 22].

When examined according to time of day, headaches started most frequently in the afternoon (86.9%), and this rate was 85.9% for migraines and 87.8% for tension-type headaches. In a review of 15 studies on migraine chronobiology, migraines were found to start most frequently in the morning hours (06.00-12.00) in 11 studies and in the afternoon hours (12.00-18.00) in 2 studies [23]. Considering the possible measures that can be taken in terms of modifications to work, school, and sleep patterns according to these findings, we believe that further studies are needed to shed light on this issue.

According to current guidelines, cranial MRI is not routinely recommended with neurological examination for recurrent headache [24-26]. However, in clinical practice, brain imaging studies are often performed because of parental anxiety and physicians' concern about overlooking an important underlying disease (for example, malignancy). There are studies in the literature reporting that 80% of patients with headache undergo neuroimaging [27]. In our study, no abnormality associated with headache was detected in the 123 patients (89.8%) who underwent cranial MRI. However, changes considered nonspecific were detected in 8.9% (n=11) of the patients who underwent MRI (nonspecific white matter changes in 6 patients (55%), arachnoid cyst in 4 (36%), and minimal cerebellar tonsillar herniation in 1 patient (9%). MRI findings were less common in our study compared to a previous study in which 28.9% of patients with recent headache had brain MRI abnormalities (nonspecific gliotic focus in 2.6%, arachnoid cyst in 2.3%, Chiari type 1 in 0.3%) [21].

The patient's mean total score on the PedsQL was 69.07±14.96 according to the children's self-assessment and 66.39±15.37 according to the parents' assessment. Their mean score on the CSHQ was 48.01±7.68. The proportion of patients with good sleep quality was only 9.5% (total sleep score of 41 or lower).

There are a limited number of studies assessing QL in pediatric primary headache with the PedsQL. In children with migraine aged 8-17 years in Austria, the median total PedsQL score was found to be 70.00 (range: 55.00-80.00) according to self-assessment. The QL among patients with primary headache in our study, a large proportion of whom had migraine, is consistent with the literature. Our study is limited cause of no control group. However, the median QL score in the healthy population was reported as 80.00 (range: 60.00-85.00) in another study [28]. Therefore, the total QL scores of the patients with primary headache evaluated in our study were approximately 10 points (12.5%) lower than those reported in the literature for healthy children. This supports the view that primary headaches significantly impair QL.

In our study, the mean total PedsQL score was 3 points lower when assessed by the parents than the child self-assessment. Although the difference was not statistically significant, we believe this might be related either to the parents' more realistic observations or to parental anxiety.

When the QL subscales were examined, it was seen that children with headache had the lowest QL scores in the school functioning and emotional domains, both in the children's' self-

assessment and in the parental assessment (Table 2). Similarly, another study evaluating the PedsQL subscales in children with migraine reported significantly lower QL in terms of school functioning (p-adjust=0.04) and significantly less frequent "good" grades than children without migraine (p-adjust=0.048) [28]. In this respect, our study is compatible with the literature and points to the importance of providing school functioning and emotional support to patients with primary headache.

As far as we know, this study is the first to assess SH using the CSHQ in children with primary headache. Since we did not have a control group, we used literature data on SH of healthy children evaluated with the CSHQ for comparison. Based on another Turkish study that reported a mean total sleep score of 46.4±6.6 in healthy children and a German study reporting scores of 42.5±5.66 among healthy children and 26.8±4.62 among healthy adolescents, the mean score in our study (48.01±7.68) indicates poorer SH in children with headache [29-30].

In a study conducted in Germany, 22.6% of healthy child participants and 20% of healthy adolescent participants reported problematic amounts of sleep-related difficulties [30]. A total score lower than 41 on the CSHQ indicates good SH, which was demonstrated by only 9.5% in the patients in our study. This supports the connection between poor SH and primary headaches.

Compared to studies reporting total sleep durations of 8.8±1 hours and 10.2±1 hours in healthy children, our patients had a shorter total sleep duration (8.14±1.17) [29-30]. This suggests that there may be a relationship between primary headache and short sleep time, and that these patients can be recommended to increase their sleep duration to 9-10 hours.

Analysis of SH subscale scores showed that the children with primary headache in our study had higher bedtime resistance, night awakenings, sleep duration, delay of sleep onset, parasomnia, sleep-disordered breathing scores compared to healthy children in the literature [29]. In addition, according to a study in which the mean duration of night awakenings was reported to be 3.1±3.6 min in healthy children, the duration of night awakenings was substantially longer in our patients (11.17±14 min), also supporting the relationship between primary headache and poor sleep quality [29].

When we evaluated the distribution of headache types according to age groups, we determined that tension-type headache was more common between the ages of 5-7 years while migraine headaches were more common among adolescents (13-18 years) (90.9% vs. 58.2%. This is consistent with the literature in which pediatric migraine was reported to be most frequent between the ages of 11 and 15 [31-32]. In a recent study examining the relationship of age and sex with primary headaches, girls were found to be significantly older than boys (11.5±2.7 vs. 10.7±2.6 years). In the same investigation, the mean age was 12.5±2.07 for migraine patients and 10.7±2.03 for patients with tension-type headache. The prevalence of primary headache was also higher in girls than boys. Girls accounted for 119 (66.5%) of the patients diagnosed with migraine and 68 (60.2%) of those with tension-type headache [21]. In our study, although there was no statistically significant difference in the distribution of headache types according to sex, we observed that migraine was more common among boys (58.3%) and tension-type headache was more common in girls (53.2%).

The strength of this study is that we used pediatric-specific tools with demonstrated reliability and validity to assess the SH and QL of pediatric patients with primary headache. Limitations of the investigation are the little

sample size and no control group. Therefore, however objectively the survey-based results were evaluated, caution is warranted when generalizing the study findings to all children with primary headache. We believe that longer follow-up studies including more pediatric patients and healthy control groups should be conducted to further examine the SH and QL of children.

Conclusion

This study underlines the need to evaluate and manage SH and QL in children with primary headache. Clinical evaluation of patients' quality of life and sleep characteristics is critical for reducing drug use in pediatric patients with primary headache, determining recommendations to enhance daily quality of life, and individualizing interventions.

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Open Access Statement

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