

Comparison of the Quality of Sleep and Intensity of Headache between Migraine, Tension Headache, and Healthy Children

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Abstract

Objectives

Headache and sleep problems are commonly reported in children, and both can adversely impact the child's life. We aimed to compare the sleep quality and intensity of headache between school-age children with migraine as well as tension headache and healthy children.

Materials & Methods

In this cross-sectional study, 198 children 6-12 yr old in three groups were enrolled from Aug 2015 to Mar 2016. Migraine and tension headache groups from the Outpatient Clinic of Imam Khomeini of Hamadan, western Iran and healthy group from elementary schools were randomly selected (66 children in each group). Data were collected using demographic questionnaire, Child Sleep Habits Questionnaire (CSHQ), Numeric Scale of Pain Intensity and Wong-Baker Faces Pain Rating Scale. The data were analyzed using SPSS by descriptive statistic and multivariate ANOVA, one way ANOVA, Chi-square, Kruskal-Wallis and linear regression tests.

Results

Approximately, 45.5% of children with migraine and 37.9% of them with tension headache had experienced severe headache. Only a significant relationship was seen between mean scores of headache intensity and sleep quality in migraine group ($P < 0.05$). There was a significant difference in mean scores of sleep quality among three groups ($P < 0.001$).

Conclusion

The children with migraine experienced more unsuitable sleep in duration of severe headache. Highlighting the co-morbidity between intensity of headache and sleep problem of children with migraine and tension headache is important to improve treatment strategies and to know the impact of headache on their normal life.

Keywords: Tension headache; Migraine; Sleep quality; Child

Introduction

“Headache is one of the most common neurological symptoms reported in childhood and adolescence” (1). Prevalence range of migraine in the pediatric population is 3.3%-21.4% and it increases from childhood to adolescence (2). “The prevalence of migraine headache was 12.3% (95% CI: 10.2–14.4) and tension-type headache was 4.2% (95% CI: 2.9-5.6) in Yazd City, Iran” (3).

Due to the impact on quality of life and reduced efficiency in children, migraine and tension headaches are considered as two fundamental problems in childhood (4). Tension headaches are usually not enough severe to cause serious disruption in social life of children (5). However, children with migraine headache have worse consequences, especially in terms of quality of life and school attendance, compared to those without migraine (6). Migraine headache in most cases is accompanied by other symptoms such as nausea and vomiting. Fatigue and physical activity can also exacerbate these symptoms (7). Regardless of the economic impact of pharmaceutical costs, repetition and persistence of headache in children has adverse effects on personal performance, social and educational situation (8). Besides, migraine and tension headaches have adverse effects on sleep quality and mental health. In fact, both sleep disturbances and headache disorders are widespread health problems during childhood (6).

The existence of a complex and multilateral relationship between sleep quality and headache intensity has been recognized for over a century, although the nature of this association is still enigmatic. It is known as sleep deprivation or a prolonged sleep can favor the onset of headache,

in particular, migraine attack in many cases, and especially in children (6). On the other hand, headache may be one of the causes of sleep problems (9). Sleep difficulties in children with migraine and tension headaches when they suffer from severe headache included insufficient sleep, difficulties falling asleep, anxiety and stress related to sleep, restless sleep, night waking, nightmares, and fatigue during the day (10). Moreover, sleep quality and insomnia factors affect their quality of life as well as the intensity of headache (11). Many studies were done with different approaches and different age ranges, but found similar results. A significant relationship between insomnia and tension and migraine headaches is reported (12, 13), and patients with migraine had high midnight insomnia, sleepwalking and sleep disorders overnight and low pain threshold (14). Almost 50% of people with migraine headache had insomnia, 38% slept less than six hours per night and 50% of patients had sleep disturbances during migraine headache attacks. Moreover, children with tension headaches in the age range 8-15 yr were sleepy during the day and had little energy (15).

Total sleep time in children with migraine and tension headaches are lower than those have no headaches. Insomnia is a common complaint in children with tension and migraine headaches (16). Because of the differences in the duration, frequency, and intensity of pain in migraine and tension headaches, effect of it on sleep quality of children is different. Since, sleep plays an important role in physical, behavioral and emotional growth of children, it also affects the cognitive function, academic achievement, and concentration power.

When the headache diagnosis is established, management must be built on the frequency and

severity of a headache and the influence on the child's lifestyle. The pediatric nurses in outpatient clinics have a key role in management and providing counseling for the children and their families to prevent further headaches and any discomfort (17). The importance of childhood headaches and other reports about sleep quality and associated factors, so we decided to compare the quality of sleep and headaches between school-age children with migraine well as tension headaches and healthy children.

Material & Methods

In this cross-sectional study, the sample was 198 school-age children divided into three equal groups as follows: 66 patients with migraine headache, 66 participants with tension headache and 66 healthy children. The study was conducted from Aug 2015 to Mar 2016.

The sample size was calculated (18) and the following equations: By considering $\alpha=0.05$, 80% of power and 10% loss, the required sample size in each group was calculated to be 66.

$$\delta = \mu_{\max} - \mu_{\min} = 12$$

$$s = 18$$

$$d = \frac{\delta}{s} = \frac{12}{18} = .3$$

$$f = \frac{d}{2} \sqrt{\frac{k+1}{3(k-1)}} = 0.3$$

Children with migraine and tension headaches based on inclusion criteria were selected using simple random sampling method from their medical records archive in the Outpatient Clinic of Imam Khomeini in Hamadan, western Iran. For healthy group, four elementary schools (2 females'

and 2 males' schools) was selected using cluster random sampling method from the schools of two regions of Education Office in Hamadan City. Then based on the inclusion criteria and the list of student names, subjects were selected using simple random sampling from each class of selected schools.

Inclusion criteria were children aged 6 to 12 yr enrolled in one of the six grades of elementary school; non-admitted to the hospital at the time of the study; diagnosis of migraine and tension headaches by a neurologist (history and physical and neurological examination, diagnostic criteria for migraine and criteria for tension and chronic daily headaches; a history of migraine and tension headaches at least four months; experienced at least two attacks of migraine or tension-type headaches during last months; lack of other acute and chronic diseases; and having parents/caregivers with basic education to be able to read and write. Additional inclusion criteria for healthy group were absent a history of physician visit because of chronic or recurrent headaches; no school absence due to any headache experiences.

Data collection tools included demographic questionnaire, Numeric Scale of Pain Intensity, Wong-Baker Faces Pain Rating Scale and Child Sleep Habits Questionnaire (CSHQ). Demographic questionnaire contains 22 questions about age, sex, the length of disease, age at an onset headache, cause of headache, type of drug use, duration of drug use, history of migraine in the family, parent level of education, the job of parents, etc. The self-reporting Numeric Scale of Pain Intensity (Version 11) includes of numerical rating ruler in the range of 0- 10. Zero score indicates without pain and 10 indicate the highest level of pain. The scale is

applicable for children 9 yr and older who are able to count the numbers. The child was asked to select a score that better express the severity of their last experience of headaches (19). Wong-Baker Faces Pain Rating Scale is a self-reporting scale for children 3-8 yr old. It had six images from smiley face (indicating pain-free status and its score are equal to zero) to tearful face (the highest level of pain and its score is equal to 10) (20). The Child Sleep Habits Questionnaire (CSQH) is a parental report questionnaire about a child's average sleep in the close recent usual week (21). It has 33 items with three Likert options (usual, sometimes and seldom) in eight subscales: (a) Bedtime Resistance (BTR), (b) Sleep Onset Delay (SOD), (c) Sleep Duration (SD), (d) Sleep Anxiety (SA), (e) Night Wakening (NW), (f) Parasomnia (PS), (g) Sleep-Disordered Breathing (SDB), and (h) Daytime Sleepiness (DTS). There are 2 items (Item 5 and 8) that are common to the BTR and SA subscales. A total score can be obtained by summing up the scores of the 33 items and the score range was 33-99. Subscale's scores can be obtained by summing up their respective items. Higher scores indicate more sleep problems (22).

Numerical Rating Scale of Pain Intensity and Wong-Baker Faces Pain Rating Scale has been used in several studies (19, 22-23). Spearman correlation coefficient of 0.90 represented a perfect reliability for Wong-Baker Faces Pain Rating Scale (22). In the present study for both scales, Cronbach's alpha was 0.87. Spearman correlation coefficient of 0.97 represented a perfect reliability of the Persian version of CSQH [23]. In our study, Cronbach's alpha was 0.84 for CSQH (23).

Demographic and CSQH questionnaires were completed by one of the parents. The tools for

self-report evaluation of headache intensity were Wong-Baker Faces Pain Rating Scale in children 6-8 yr old and Numerical Scale in children aged 9-12 yr old. Data gathering was made under parents' supervision.

Data analysis

Statistical analyses were performed using SPSS version 16 (Chicago, IL, USA). Data were presented as means \pm SDs, frequency distributions and in order to compare the characteristics of studied groups, one-way and multivariate ANOVA, chi-square, Kruskal-Wallis and linear regression tests were used. In order to assess the relationship between sleep quality and headache Spearman correlation coefficient was used. In all statistical tests, significance level was 0.05.

Ethics

The study was approved by the Ethics Committee of Hamadan University of Medical Sciences (IR.UMSHA.REC.1394.188). Written informed consents were obtained from the parents or legal surrogates of the study subjects.

Results

The majority of subjects with migraine (57.6%), tension headache (60.6%) and healthy groups (45.5%) were female and in the age range of 8-10 yr old (48.5%). In tension headache group, the majority of subjects did not consume any medication (84.8%). In both groups with migraine and tension headache, the incidence of headache attacks at day was more than at night. Moreover, in 66% of children with migraine headache, there was a positive history of headache in their family. The mean hours of sleep at night were 6.75 ± 1.31 h in migraine group, 7.7 ± 1.27 h in the tension

headache group and 8.02 ± 0.89 in healthy group.

One-way ANOVA analysis showed a significant difference in mean scores of sleep quality of children between three groups ($F(2,195) = 29.675$, $P < 0.001$). Based on Post Hoc test, the sleep quality in children with migraine was lower than in other two groups (Table 1). The highest mean

score of sleep quality subscales belongs to daytime sleepiness subscale in migraine group (14.33 ± 3.59) and then in tension headache (12.52 ± 2.52). Kruskal-Wallis nonparametric test showed a significant difference in the mean score of all eight subscales of sleep quality between three groups ($P < 0.05$).

Table 1. Comparison of sleep quality between three groups

Groups	Sleep quality			P-value
	Minimum	Maximum	Mean \pm SD	
Migraine headaches	22	78	57.14 ± 8.72	F= 29.67 df ₁ = 2 df ₂ = 195 P<0.001
Tension headaches	43	63	52.55 ± 4.8	
Healthy	37	39	48 ± 6.22	

The findings in relation to the intensity of migraine headache showed that 45.5% of children with migraine and 37.9% of them with tension headache had experienced severe headache (Table 2). Chi-

square test showed no significant difference between the intensity of children's headache in these two groups.

Table 2. Comparison of headache severity between Migraine and Tension type groups

Headache Severity	Migraine		Tension type		P-value
	N	%	N	%	
Low	4	6.1	15	22.7	P= 0.048
Moderate	29	43.9	22	33.3	
Severity	33	50	29	44	
Total	66	100	66	100	

Comparison of the Quality of Sleep and Intensity of Headache between Migraine, Tension Headache, and Healthy...

According to the Spearman correlation, there was a significant relationship between mean scores of intensity and sleep quality in migraine group ($P < 0.05$). In other words, in children with migraine headache, the sleep quality was decreased due to severe headaches (Table 3).

Table 3. Relationship between sleep quality and headache severity in Migraine and Tension type groups

Group	Sleep quality and headache severity	
	R	P-value
Migraine	0.0002	$P = 0.935$
Tension	0.203	$P = 0.041$

Sleep quality of children in migraine group was significant related with onset and duration of headache, type and dosage of medication, history of migraine headaches in the family, amount of sleep during day and night ($P < 0.001$), and the age of first headache attack ($P < 0.05$) (Table 4).

Table 4. Liner Regression result in migraine group

Variable	Beta In	S. E.	T	P-value
Constant	61.085	0.579	105.381	.000 v
Length of migraine disease (month)	0.008	0.008	0.991	0.322
Duration of headache (minute)	0.042	0.009	4.570	.000*
Duration of using medication (month)	2.424	0.244	9.910	.000*
Dosage of medication	0.025	0.001	17.21	.000*
The age of first headache attack (year)	-0.455	0.056	8.048	.000*
History of migraine in the family	0.203	0.222	0.915	0.36*
Amount of sleep during day (hour)	0.528	0.068	7.741	.000*
Amount of sleep during night (hour)	-1.702	0.065	31.07	.000*

Dependent Variable: sleep quality Significant in $P < 0.001$

Discussion

Children with migraine headache experienced more sleep disturbances than those with tension headache and healthy children. Sleep quality in children with migraine headache was lower particularly when they experienced severe headaches. Sleep is one of basic and essential needs for the survival and health of children. Moreover, sleep quality has a key role in health

maintenance as well as healing (8). Therefore, reducing sleep quality for any reason can endanger children's physical and mental health. Although, different surveys in large pediatric populations have confirmed the strong association between headache and different sleep disorders, such as parasomnias, insomnia, sleep-breathing disorders, and daytime sleepiness (24,25). The association between headache and sleep quality was examined in children and adolescents with migraines aged 5-15 yr old. Sleep quality in children with migraine was lower than that of healthy children (26). One of the largest clinical studies published to date reported sleep complaints among 1283 migraine patients presenting for headache treatment (27). In contrast, in another study, the type of sleep pattern was effective in headache occurrence and poor sleep was known as the main cause of headache (28).

Among adolescents and children with migraine and tension-type headache, insomnia is the most common sleep complaint, reported by one-half to two-thirds of patients with headache in outpatient clinic (29). However, in the present study, all type of sleep problems happened more frequent among school-age children with migraine compared with tension headache and healthy children. However, daytime sleepiness was the common sleep complaint among the children with migraine and tension headache. Similar to the present study, the sleep problems were more frequent among school-aged with migraine compared with non-migraine and no headache groups (30).

Our findings showed that there was a relationship between sleep quality and pain intensity in children with migraine and tension headaches, inconsistent with another study (31). The headache

severity and time of onset of headache were two important factors of sleep disorders in children and adolescents with migraine aged from 10 to 18 yr old (32).

After controlling for child demographics, we found that the months of migraine disease and duration of headache, type and dosage of medication, history of migraine headaches in the family, amount of sleep during day and night and the age of first headache predicted the sleep quality of children in migraine group. The duration of headache attacks was one of predicting factors of school-age children with migraine's lifestyle (33). As medications can have adverse consequences on sleep of children with migraine, headache 6-13 yr old patients taking any medications were compared with headache patients taking no medications. Contradicted with our finding, they did not find any difference in the frequency of sleep disturbances between the headache patients who used medications with those who did not use any medications (30).

Although this study has reached its aims, but as a limitation, it was conducted only on a small size of population because of as shortage to time. Therefore, to generalize the results for larger groups, we suggest repeating the study involved more participants at different ages.

In conclusion, Migraine and tension headaches are the most common acute and recurrent headache pattern experienced by school-age children. The relationships between headache and sleep quality are showing poorer sleep quality and daytime sleepiness. Highlighting the comorbidity between headaches and sleep disorders is important to improve treatment strategies. Therefore, the clinical evaluation of childhood headache should include a

Careful analysis of sleep habits and patterns and the evaluation of the presence of sleep disturbances, in order to develop better treatment methods for both sleep and headache.

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Author's Contribution

Fatemeh Cheraghi and Farshid Shamsaei: Study concept and design, Development of original idea and writing the manuscript.

Afshin Fayyazi and Fahimeh Molaeei Yeganeg: Help in study performance and data collection. Ghodratalah Roshanaei: Advisor of statistical analysis.

All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest

None of the authors have any conflicts of interest to declare.

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