

Relationship between migraine and sleep disorders in adolescents

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Abstract

Background Headaches and sleep disorders may influence academic performances, personality, memory, and interpersonal relationships. Migraine is the most common headache type seen in adolescents. Although headaches and sleep disorders are believed to be related, there has been little study in this area.

Objectives To assess the relationship between migraine and sleep disorders in adolescents and compare different types of sleep disorders found in adolescents with migraine vs. healthy adolescents.

Methods We conducted a cross sectional study in December 2009 on students of three junior high schools in the Secanggang District, Langkat Regency, North Sumatera. We included adolescents aged 12 to 17 years who suffered from migraines, as defined by the *International Classification of Headache Disorders*, 2nd edition criteria (ICHD-II), and healthy adolescents who did not experience migraines as the control group. Parents filled questionnaires on their child's sleep patterns for one week.

Results A total of 100 adolescents were enrolled in the study, consisted of 50 adolescents in the migraine group and the others 50 in the control group. There was a significant difference in the incidence of sleep disorders between the two groups (76% and 30%, in the case and control groups, respectively; $P=0.0001$). Moreover, significant differences were also found in the prevalence of different sleeping disorder types between the case and control groups, i.e. insomnia (62% and 30%, respectively; $P=0.003$), sleep apnea (56% and 16%, respectively; $P=0.0001$), restlessness (56% and 18%, respectively; $P=0.0001$), parasomnia (76% and 10%, respectively; $P=0.0001$), narcolepsy (42% and 16%, respectively; $P=0.008$), and excessive daytime sleepiness (50% and 26%, respectively; $P=0.023$).

Conclusions Migraine in adolescents is significantly associated with sleep disorders. Parasomnia is the most common type of sleeping disorder observed in adolescents with migraines in our study. [Paediatr Indones. 2013;53:214-7].

Keywords: migraine, sleep disorders, adolescents

Headache is a common problem in children.^{1,2} The effects of headaches on a child's academic performances, memory, personality, and interpersonal relationships, as well as school attendance, depend on the etiology, frequency, and intensity of the headaches.¹ Migraine is the most frequent type of headache in the pediatric population. The prevalence of migraine among school-aged children between 7 to 15 years of age ranges from 8 to 23%.³ Furthermore, headaches occurring in childhood have a tendency to continue into adulthood.⁴

Sleep is a universal phenomenon for human beings, defined most consistently as a temporary loss of consciousness and an active physiologic state characterized by dynamic, ventilatory, and metabolic parameters.⁵ Sleep disorders may lead to significant morbidity, poor academic performance, cardiovascular, and endocrine disorders, as well as heightened pain perception.⁶

Both headaches and sleep disorders are common in children. Although headaches and sleep problems

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are believed to be related, there has been little study in this area. Better definition of this relationship may be useful for early diagnosis and treatment.^{7,8}

The aim of this study was to evaluate the relationship between migraine and sleep disorders in adolescents, and to compare differences in sleep disorders between adolescents with and without migraines.

Methods

We conducted a cross sectional study in December 2009 on students of three junior high schools in the Secanggang District, Langkat Regency, North Sumatera, Indonesia. We included adolescents aged 12 to 17 years who suffered from migraine as defined by the *International Classification of Headache Disorders* 2nd edition criteria (ICHD-II), and healthy adolescents without migraines. We excluded children with a history of trauma or central nervous system disorders, psychiatric disorders, or systemic diseases, such as malignancy, sinusitis, and viral infections. Adolescents who met the inclusion criteria and provided informed consent, both from the subjects and their parents, were included in this study.

Physical and neurological examinations were performed on all subjects. After receiving instructions and explanations of the questions in the

questionnaire, parents were asked to observe their child's sleeping patterns for a week and complete the questionnaire subsequently. We collected and reviewed the questionnaire sheets. Data for each type of sleep disorders (insomnia, sleep apnea, restlessness, parasomnia, narcolepsy, and excessive daytime sleepiness) were tabulated and analyzed.

Chi square test was used to evaluate the occurrence of sleep disorders between the migraine and the control groups. Differences were considered to be significant if P values <0.05.

Results

Four-hundred fifty-seven adolescents were screened for enrollment to the study. The 100 adolescents who fulfilled the inclusion criteria were divided into two groups consisted of 50 adolescents with migraines in the case group, and 50 adolescents without migraines in the control group.

We found a similar weight and height distributions between the two groups of adolescents (Table 1).

Figure 1 shows a significant difference in sleep disorders between the migraine and control groups (76% and 30%, respectively; P=0.0001). Furthermore, we also found significant differences in sleeping disorder types between the migraine and

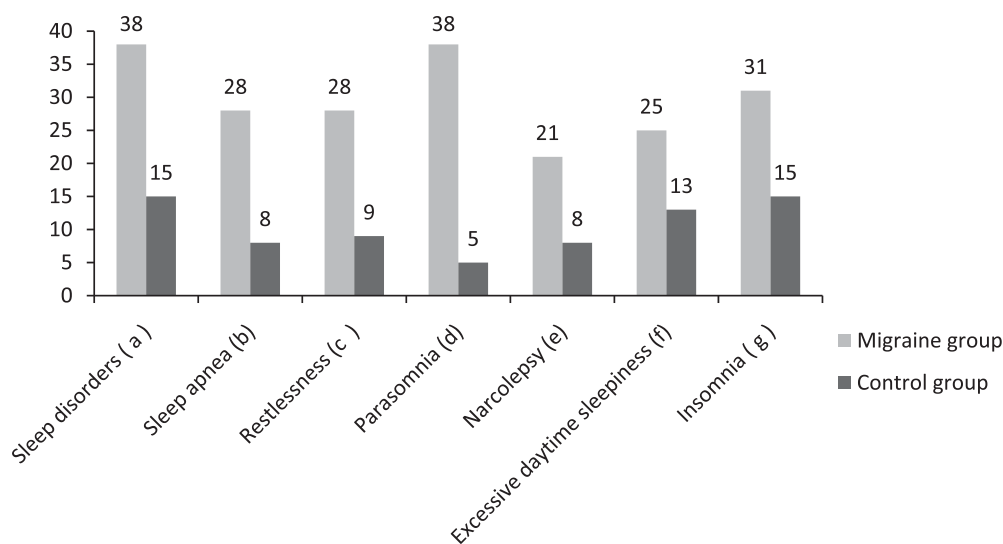


Figure 1. Differences in sleep disorders between the migraine and control group.

Note: one subject may have more than one type of sleep disorders

Table 1. Characteristics of subjects

Characteristics	Migraine group (n=50)	Control group (n=50)
Gender, n (%)		
Males	25 (50)	26 (52)
Mean age (SD), years	13.1 (0.92)	13.2 (1.05)
Mean body weight (SD), kg	41.2 (7.22)	36.8 (6.54)
Mean body height (SD), cm	148.5 (7.92)	145.8 (7.88)

control groups as follows: sleep apnea (56% and 16%, respectively; $P=0.0001$), restlessness (56% and 18%, respectively; $P=0.0001$), parasomnia (76% and 10%, respectively; $P=0.0001$), narcolepsy (42% and 16%, respectively; $P=0.008$), excessive daytime sleepiness (50% and 26%, respectively; $P=0.023$), and insomnia (62% and 30%, respectively; $P=0.003$). Parasomnia was the most common type of sleeping disorder seen in the migraine group (38 subjects).

Discussion

Headache and sleep disorders are common in the general population and often coexist in the same patients.^{9,10} Headaches are known to occur during sleep, after sleep and in relationship with various sleep stages.² Typical migraine pain is unilateral, pulsating, moderate-severe in intensity, aggravated by physical activity, and associated with nausea, vomiting, photo- and phonophobia.^{9,10} In our study, the diagnosis of migraine was based on the ICHD-II criteria.

Migraine prevalence increases with age. There is a slight predominance in boys in the pre-pubertal years, and the overall occurrence increases throughout adolescence into young adulthood, when there is a transition to a predominance in girls.^{8,11} The incidence of migraine in females peaks between ages 14 to 17 years. In school children, the prevalence of migraine increases with age, with a male preponderance in children aged less than 12 years and a female preponderance thereafter.⁸ We found similar numbers of boys and girls in our 50 subjects with migraines aged 12 to 16 years.

The relationship between sleep and headaches has been known for more than a century. Three possible relationships between the two clinical problems are (1) headaches cause sleep disorders, (2) sleep disorders

cause headaches, or (3) both headaches and sleep disorders share a common intrinsic cause.^{7,12}

A Turkish study found that sleep disorders were more common in children with migraines, compared to those with no headaches. This study also found that migraine headaches were associated with parasomnia.¹⁰ The frequency of parasomnias in the general population is lower than that of children with neurological problems.^{8,13} Children who suffer from headaches usually have a high rate of sleep difficulties, such as insufficient sleep, co-sleeping with parents, difficulty falling asleep, anxiety related to sleep, restless sleep, night waking, nightmares, and daytime fatigue.^{2,14} A previous study reported that children with headaches were found to have more frequent symptoms of primary sleep disorders than children without headaches.⁷

A Canadian study found that children with migraines had increased sleep disorders compared to their nearest-aged siblings without migraines. In particular, they suffered from more daytime sleepiness and greater sleep delay. This study also found that children with migraines who had greater sleep disorders also showed more behavioral problems.¹⁵ Several findings have suggested a role for chronobiological factors in migraines, probably related to hypothalamic involvement. Clinical observations showed that migraine attacks have seasonal, menstrual and circadian timings, suggesting a role for chronobiological mechanisms and their alterations in the disease.²

An Italian study found that the relationship between headache and sleep problems was evident even in a non-clinical population of children and adolescents, with the migraine group showing poorer sleep quality, sleepiness, and a tendency to be more active in the evening.² In our study, subjects' sleeping patterns were observed by their parents for one week,

followed by questionnaires and interviews. We found a significant relationship between migraines and sleep disorders. We also found that parasomnia was the most common sleep disorder in the migraine group.

An Ohio, US study reported that children with migraine headaches have a high prevalence of sleep disturbances. The direction of the relationship between headaches and sleep is unknown. Nevertheless, interventions targeting sleep habits may improve headache symptoms and effective treatment of headaches in children may positively impact sleep.¹⁶

Migraines can potentially increase the risk of sleep disorders for several reasons. First, frequent headaches may prevent the child from going to sleep or lead to night waking, although the latter is uncommon in children with migraines. Second, many children with migraines fall asleep if the headache comes on during the day and, indeed, sleep is usually associated with resolution of headache. This tendency can lead to interruption of the normal sleep-wake cycle, predisposing the child to sleep disturbances. Third, children or families might worry that persistent headache is an indication of serious pathology, and this anxiety may impair sleep. Fourth, migraine may be associated with disturbed sleep architecture. Finally, many prophylactic medications used for migraine have sedation as a side effect. As a result, these are more often given as a single bedtime dose, however, some children may experience residual daytime somnolence.¹⁵

Our study had several limitations. The cross-sectional design means that future study is needed to determine the direction of the relationship between migraine and sleep disorders. A longitudinal study examining changes in migraine sleep behaviours over time may shed light on this issue. Also, sleeping patterns were based on parental reports, which may have been somewhat subjective. Subjects recruitment was also subjective, in that organic and non-organic headache differed only on clinical signs and migraines were not classified as aura or classic.

In conclusion, migraine in adolescents is associated with sleep disorders and adolescents who suffered from migraines complain more frequently of sleep disorders. Parasomnia is the most common type of sleeping disorder observed in adolescents with migraines.

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