

THE RELATIONSHIP BETWEEN HEADACHE AND SLEEP

Sejal Jain

Sleep and headache have complex interrelationship. Sleep deprivation and disruption is one of a strong trigger for occurrence of headaches. Sleep also functions as an effective acute treatment of headaches. In addition, certain sleep disorders also cause headaches. On the other hand, headaches may worsen the sleep quality. Answering the following questions may shed light on these interrelationships as well as management strategies.

- 1) Do headache syndromes and sleep have intrinsic association?
- 2) What sleep disorders/problems are associated with headaches?
- 3) Are there long term effects of sleep problems on headache syndromes?
- 4) How do you evaluate sleep problems in children with headaches?

1) Do headache syndromes and sleep have intrinsic association?

Headaches, due to several primary headache syndromes are closely associated with specific sleep stage. These disorders include migraines, cluster headaches and chronic paroxysmal hemicranias. Migraines tend to occur around awakenings or during nocturnal sleep. The attacks are more likely to occur during REM sleep or during arousals from slow wave sleep. The prodrome of migraine, which is seen 24 hours before an attack, in more than half of the subjects, includes sleep disturbances. Additionally, occurrence of cluster headaches follow a strong circadian pattern which is same for the same individual. Most of these attacks are believed to occur out of REM sleep, even though occurrence out of other sleep stages have been seen. Surprisingly, the headaches affect sleep structure minimally.[1]

Another evidence that primary headaches are associated with intrinsic sleep patterns comes from studies on melatonin. Melatonin levels are reduced in patients with migraine, menstrual migraine and cluster headaches. Additionally, during a cluster period, melatonin delay is noted in peak melatonin levels. Hence, using melatonin and changing sleep-wake cycle has been a strategy for treatment of cluster headaches.[1]

2) What sleep disorders/problems are associated with headaches?

Several studies suggest that, in children with headaches, increased sleep problems are noted. A questionnaire based study enrolled large sample of school-age children with migraine, tension-type headache and healthy controls to evaluate sleep patterns. The results show that twice as many children with migraine and tension-type headaches have shorter sleep duration and prolonged sleep latency compared to controls. Children with headache have higher difficulty falling asleep as well as fear or anxiety related to sleep. Increased nighttime awakenings were also noticed in headache groups. In addition, about a third of the children had restless sleep in the headache groups, sleep breathing problems in the migraine group, and sleep talking, bruxism and frightening dreams in the migraine group.[2] Similarly, in a school-population based study, children with migraine had higher sleep problems, increased sleepiness and preferred evening hours. Poor sleep was reported as the most frequent trigger.[3] Another study showed that snoring, parasomnia, daytime sleepiness and sweating during sleep were more common in children with migraine as compared to non-migraine headaches.[4] In adolescents with migraine, insufficient total sleep, daytime sleepiness, difficulty falling asleep and frequent nighttime awakenings are seen. In this population, sleep quality is significantly affected by headache pain intensity and duration of headache.[5] Importantly, in a study where a group of children with migraines, who received sleep hygiene instructions, reported shorter headache duration at 6-month follow up, as compared to children without sleep instructions.[6]

Despite the compelling information, limited data exist for polysomnographic identified sleep disorders in patients with primary headache disorder. In a retrospective study, polysomnography results from children with migraine, tension-type headache and non-specific headaches were evaluated. Children with tension-type headache had two-fold increased risk of bruxism. Children with migraine more commonly had obstructive sleep apnea (OSA) as compared to children with tension-type headache. Presence or absence of OSA was not associated with migraine severity. However, patients with severe migraine had shorter total sleep time, shorter REM sleep, reduced slow wave sleep, and increased sleep latency and arousals.[7]

When we consider other sleep disorders, four times more children with migraine had restless leg syndrome compared to healthy controls. More than a quarter of the children with migraine had a polysomnographic periodic limb movement index of more than 5 per hour which was associated with a higher frequency, intensity, duration of pain; higher functional impairments and lower response to prophylactic treatment of migraine.[6] Moreover, parasomnias such as night terror, sleep walking and enuresis are also associated with migraines.

Even though adult studies show that multiple sleep disorders are associated with headaches, limited evidence exist in children. Nevertheless, headache is reported in up to 70% of adults with OSA and is improved with OSA treatment with continuous positive airway pressure (CPAP). Both tension-type headaches and migraines have significantly high prevalence in narcolepsy.[6]

These data provide a compelling argument that in children with headache, presence of sleep disorders should be evaluated. The identification and treatment of sleep disorder has a potential to improve headache. Additionally, headache could also be a presenting feature of a sleep disorder. Hence, accurate diagnosis may be required for adequate management.

3) Are there long term effects of sleep problems on headache syndromes?

Sleep disorder in infancy and childhood may be predictive of headache persistence. In a study in children with persistent headache, 78% had sleep disorder. In a long-term study in adolescents, sleep disorders were the most common comorbid disorder at the onset of headaches.[2] In addition to these, population based studies have shown that presence of insomnia increases the risk of future headache. Danish subjects with insomnia with episodic tension-type headache were more likely to develop chronic tension-type headache at 12-year follow-up. Additionally, presence of insomnia symptoms in a headache-free, Norwegian cohort was a predictor of tension-type and migraine headaches developing several years later. Similar findings were seen in a British cohort.[8] These data suggest that poor sleep poses a risk for developing a headache syndromes and improving sleep may benefit future development of headache.

4) How do you evaluate sleep problems in children with headaches?

An evaluation strategy and guidelines are shown in the Figure 1, Table 1 and Table 2. Direct questioning for sleep related issues are important for initial screening of sleep disorders. The questions related to difficulty falling asleep, difficulty staying asleep, daytime drowsiness and specific questions about sleep disorders such as snoring, restless sleep, night time events, leg pains in evenings etc. may be asked. In addition, a variety of questionnaires are available which can be used instead of standardized questions. These include Children's Sleep Habits Questionnaire (CSHQ), Sleep Disturbance Scale for Children (SDSC), Sleep Behavior Questionnaire (SBQ), Sleep disorders inventory for students (SDIS), Pediatric Daytime Sleepiness Scale (PDSS) etc. SDSC and SDIS screen for wide range of sleep disorders, while, SBQ and CHSQ screen more general symptoms and behavioral/non-behavioral insomnia. PDSS screens specifically for daytime sleepiness.

Figure 1 Algorithm for sleep evaluation

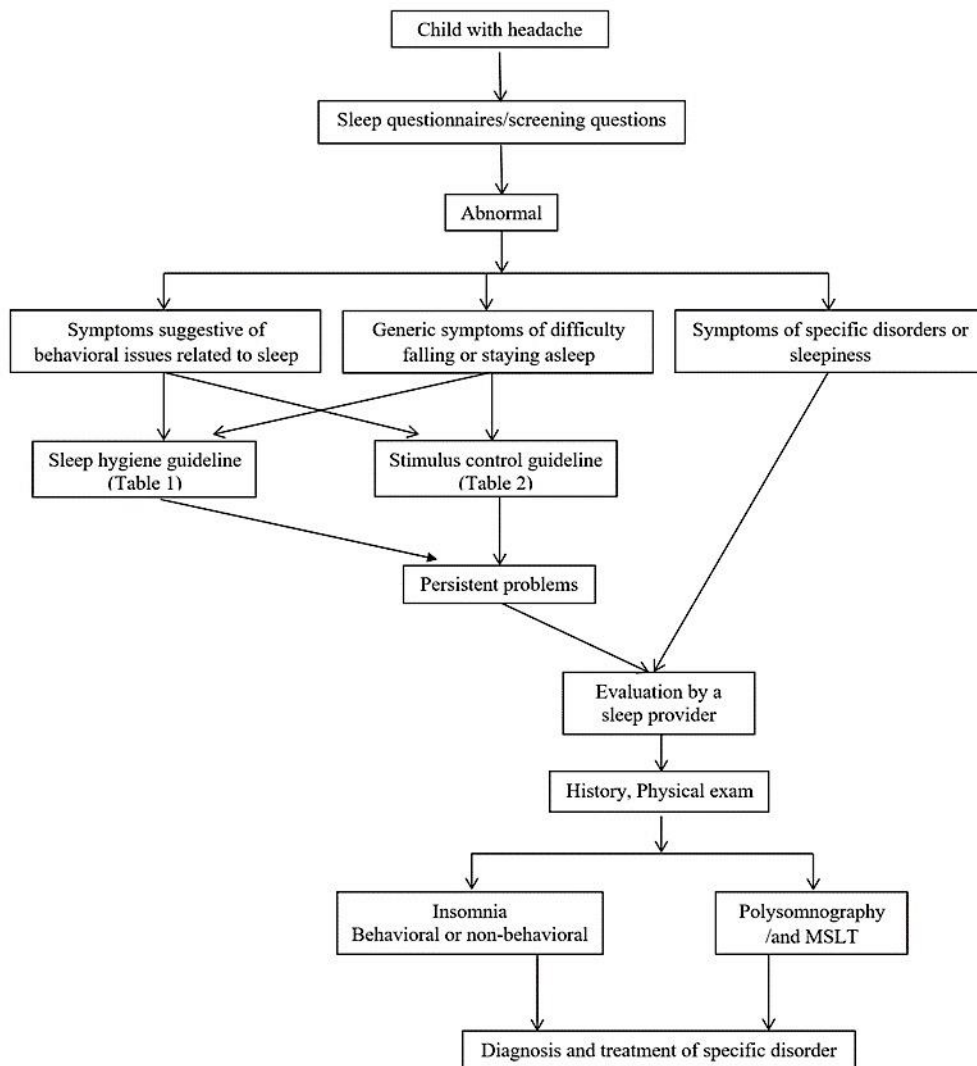


Table 1-Sleep Hygiene Guidelines

1. Go to bed at the same time each day.
2. Get up from bed at the same time each day. Do not have more than one hour difference between sleep schedule on weekdays and weekends.
3. Napping should be age and development depended. In general, children older than 5 or 6 years of age do not need a nap under normal circumstances. Avoid too long or too frequent naps.
4. Children and adolescents should sleep in their own beds by themselves.

Table 2-Stimulus Control Guidelines

1. Restrict activities in bed to sleeping only (no television, reading, playing games, texting on phone etc).
2. Avoid exposure to bright lights before and during sleep (do not watch television do not keep a light on while sleeping).
3. Keep your sleeping environment (bedroom) relatively free from loud noises/distractions.
4. Vigorous activity should be avoided 1-2 hours before bedtime.

5. Avoid caffeinated beverages and foods (coffee, soda, chocolates, tea, and certain medications) [and cigarettes] for least 6-8 hours before going to bed. These substances act as stimulants and interfere with the ability to fall asleep.

Suggested Reading

- Dodick, D.W., et al., *Clinical, anatomical, and physiologic relationship between sleep and headache*. Headache, 2003. **43**(3): p. 282-92.
- Bellini, B., et al., *Headache and sleep in children*. Curr Pain Headache Rep, 2013. **17**(6): p. 335.
- Dosi, C., et al., *Sleep and Headache*. Semin Pediatr Neurol, 2015. **22**(2): p. 105-12.
- Vendrame, M., et al., *Polysomnographic findings in children with headaches*. Pediatr Neurol, 2008. **39**(1): p. 6-11.

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1. Dodick, D.W., et al., *Clinical, anatomical, and physiologic relationship between sleep and headache*. Headache, 2003. **43**(3): p. 282-92.
2. Bellini, B., et al., *Headache and sleep in children*. Curr Pain Headache Rep, 2013. **17**(6): p. 335.
3. Bruni, O., et al., *Relationships between headache and sleep in a non-clinical population of children and adolescents*. Sleep Med, 2008. **9**(5): p. 542-8.
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7. Vendrame, M., et al., *Polysomnographic findings in children with headaches*. Pediatr Neurol, 2008. **39**(1): p. 6-11.
8. Finan, P.H., B.R. Goodin, and M.T. Smith, *The association of sleep and pain: an update and a path forward*. J Pain, 2013. **14**(12): p. 1539-52.