

Original Article

Relationships between headache and sleep in a non-clinical population of children and adolescents

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Abstract

Background: Headache and sleep are related in different ways and alterations of chronobiological mechanisms are involved in headache. We investigated the relationships between headache and sleep quality in a large non-clinical population of children and adolescents and evaluated the relationship between headache and circadian typologies.

Methods: A total of 1073 children and adolescents (50.9% males; mean age = 10.56; range = 8–15 years) were recruited from four schools in Rome. They filled out the questionnaires individually in classrooms, after brief group instruction about answer formats. The questionnaires included (a) a self-report headache questionnaire to collect information on different aspects of headache attacks based on the International Classification of Headache Disorders-2nd edition (ICHD-2); (b) the School Sleep Habits Survey that incorporated questions about sleep habits, the Sleep–Wake Problems Behaviour Scale (SWPBS), the Sleepiness Scale (SLS) and the Morningness/Eveningness Questionnaire (MEQ).

Results: According to ICHD-2 criteria, we classified 70 (6.5%) children as Migraine Group (MG), 135 (12.7%) as Non-Migraine Headache Group (NMG), and the remaining 868 (80.8%) were classified as Headache-Free Group (HFG). No clear differences have been found between MG and NMG regarding the frequency of the attacks, although MG showed a significantly increased frequency of long-lasting attacks. The modality of onset of pain and the location of pain was similar in both groups. The most frequent triggering factor for headache in MG and NMG was “a bad sleep” (32.2%) followed by emotional distress (27.8%). No differences have been found between MG, NMG and HFG in sleep schedule or sleep duration. MG and NMG showed significantly higher scores on the SWPBS vs. HFG, while MG presented higher scores on the SLS compared to NMG and HFG. MG presented lower MEQ scores, indicating a more pronounced eveningness.

Conclusions: The relationships between headache and sleep problems are evident even in a non-clinical population of children and adolescents, with MG showing poorer sleep quality, sleepiness and a tendency toward eveningness.

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Keywords: Headache; Sleep; Children; Circadian typology; Migraine; Sleepiness

1. Introduction

Headache is a common problem in children. Seventy percent of all children have suffered from a headache at

least once and 20% of 15-year-old children have had recurrent headaches [1].

The relationships between sleep and headache have been widely studied in the last few years. Headaches are known to occur during sleep, after sleep and in relationship with various sleep stages [2–5].

Both sleep deprivation and excess sleep may result in headaches, and inadequate sleep duration or poor sleep

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quality are common triggering factors for migraine headaches [6]. However, sleep, either spontaneous or induced by hypnotics, has been shown to be effective relief of head pain or even to terminate the attacks in adults [7–9] and children [10] suffering from headaches.

On the other hand, headache may cause various degrees of sleep disruption and is associated with several sleep disturbances in adults and children [6,9,11].

Children who suffer from headache have usually a high rate of sleep difficulties, such as insufficient sleep, co-sleeping with parents, difficulties falling asleep, anxiety related to sleep, restless sleep, night waking, nightmares, and fatigue during the day [12,13]. Furthermore, headaches have been linked to specific sleep disorders, such as parasomnias [14–17], and surveys in large pediatric populations have confirmed a strong association between headache and sleep disorders such as parasomnia, insomnia, sleep-related breathing disorders and daytime sleepiness [12,13]. Miller et al. [13] demonstrated that frequency and duration of migraine headaches predicted specific sleep disturbances such as sleep anxiety, parasomnias, and bedtime resistance. Consequently, head pain could be the consequence of a subtle undiagnosed sleep disorder or of bad sleep habits.

Heng et al. [18], in a recent study, reported that children with migraine are prone to more frequent sleep and behavioral disturbances than children without headache, mainly represented by sleep phase delay and daytime sleepiness.

Sleep phase delay in children who experience migraines can be treated successfully with the modification of sleep hygiene practices which are able to improve frequency and duration of attacks [19]. The manipulation of the sleep–wake pattern might greatly improve migraine, probably acting chronobiotically.

In addition, several findings have suggested a role for chronobiological factors in migraine, probably related to a hypothalamic involvement [20]. Clinical observations showed, indeed, that migraine attacks have a seasonal, menstrual and circadian timing, suggesting a role of chronobiological mechanisms and their alterations in the disease [21]. Very few data are available on this topic and almost none for children. A recent study in adults showed that migraine patients were more frequently morning and evening type subjects than controls and showed a tendency towards worse sleep quality and higher disability [22].

The preference for morning or evening activity patterns is believed to contribute to interindividual differences in the timing of circadian rhythms. The morningness–eveningness (M/E) preference might be considered as a continuum between two extremes: morning types (larks) and evening types (owls). A consistent shift toward eveningness during adolescent development was demonstrated in several studies, as well as the differ-

ences in sleep habits between morning and evening types [23–25].

The aims of this study were (1) to investigate the relationship between headache and sleep quality in a large non-clinical population of children and adolescents, by means of self-administered questionnaires on sleep and headache, and (2) to evaluate the relationship between headache and circadian typologies.

2. Methods

2.1. Subject and procedures

All subjects were recruited from four schools randomly selected from among schools in Rome. The aims of the study were illustrated to the headmasters and teachers, indicating that the study was designed to evaluate sleep habits and quality and the occurrence of headache in the juvenile population. After their agreement, the questionnaires were presented (*School Sleep Habits Survey*, *Headache Questionnaire*) to the classrooms and the aims of the research were briefly explained. The questionnaire was submitted to 1115 subjects whose parents provided informed consent.

The children filled out the questionnaires individually in the classrooms, after brief group instruction on answer formats, and the administration lasted 45–60 min. The questionnaires were not filled out anonymously (i.e., children wrote only their last name and not the family name), but subjects were assured that their questionnaires would be handled with discretion. The protocol of the study was approved by the Local Institutional Ethics Committee.

The return rate was 96.3% and the study group consisted of 1073 children and adolescents (50.89% males and 49.11% females; mean age = 10.56 ± 0.50 ; range = 8–15 years). Males and females did not differ in age [$F_{(1,1071)} = 0.01$; NS].

2.2. Measures

2.2.1. Headache questionnaire

A self-report questionnaire was developed by the present authors in order to collect information on different aspects of headache attacks, such as frequency, their duration and severity, nature (pressing/tightening or pulsating) and localization of pain, accompanying symptoms, and subjective evaluation of trigger factors, based on the International Classification of Headache Disorders-2nd edition (ICHD-2) [28]. This questionnaire was prepared with graphics and language appropriate to the age of the patients and was previously administered to a pilot sample of children in order to assess the ease of use and compliance with use of the diaries.

Migraine was diagnosed according to the following ICHD-2 [28] criteria:

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