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Impact of sleep disorders on the frequency and intensity of migraine in adolescents: a systematic review

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Introduction

Migraine is a prevalent and disabling neurological condition in adolescents, maintaining a complex bidirectional relationship with sleep disorders. Poor sleep quality and insomnia are not just comorbidities, but factors that directly influence the frequency, duration, and intensity of attacks, contributing to pain chronification and significant functional impairment in this population.

Objective

To analyze the magnitude of the impact of sleep disorders on the frequency and intensity of migraine in adolescents, describing the associated neural and clinical mechanisms.

Methods

A systematic review was conducted in the PubMed and LILACS databases with articles published between 2011 and 2025 in English and Russian. From an initial total of 148 articles, 34 were selected for full-text analysis, including randomized clinical trials, observational studies, and functional neuroimaging research. The analysis was structured according to the PICO strategy, where the Population consisted of adolescents diagnosed with migraine or continuous primary headaches; the Intervention/Exposure encompassed the presence of sleep disorders—such as insomnia, poor sleep quality, fatigue, snoring, and restless legs syndrome—and specific therapeutic interventions; the Comparison involved confrontation with healthy control groups or correlation assessments between sleep severity and painful symptoms; and the Outcomes focused on the impact on monthly attack frequency, pain intensity, functional disability, and changes in thalamic neural connectivity.

Results

The literature demonstrates that poor sleep quality is a robust predictor of attack frequency in adolescents. Insomnia and sleep deprivation significantly increase the number of headache days per month and headache-related disability. Fatigue correlates with attacks of longer duration and higher monthly frequency. Neuroimaging evidence reveals that sleep deprivation modulates pain processing via altered functional connectivity between the posterior thalamus and cortical areas, such as the prefrontal and visual cortex. Interventions that improve sleep parameters, such as hybrid Cognitive-Behavioral Therapy (CBT-I) and the use of eszopiclone, resulted in a significant reduction in monthly headache frequency. Additionally, habitual snoring was identified as an independent predictor of chronic morning headaches, and restless legs syndrome was associated with a higher disease burden and worsening of painful symptoms.

Conclusion

Sleep disorders negatively impact migraine severity in adolescents, elevating the frequency and intensity of attacks through neural and psychosocial mechanisms. Systematic screening of sleep quality and the implementation of integrated treatments, both behavioral and pharmacological, are fundamental to improving functionality and quality of life for these patients.

Keywords:
Migraine
Adolescents
Insomnia
Sleep

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