Sleep Disturbances and Behavioral Disturbances in Children and Adolescents

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KEYWORDS

• RLS • PLMD • OSA • Parasomnias • Hypersomnias • Polysomnography • Electroencephalogram

KEY POINTS

- Normal sleep–wake function evolves from infancy to adolescence.
- Sleep complaints are common in the pediatric population.
- Sleep disturbances can often lead to neurocognitive and psychosocial impairments.
- Sleep disturbances in children and adolescents should be appropriately diagnosed and treated with behavioral and pharmacologic interventions as indicated.

INTRODUCTION

Sleep is an essential component of development and is required for physical and mental health. Unfortunately, sleep deprivation and sleep disorders are prevalent among children and adolescents (0–19 years). Cross-sectional surveys of Canadian high school students reported that up to 70% of students get less than the recommended amount of sleep for their age.[1] In addition, 25% to 50% of youth are affected by some type of sleep disorder during infancy, childhood, and/or adolescence.[2] Inadequate sleep has a pervasive negative impact on the health, cognitive function, and quality of life of children and adolescents, which in turn causes significant economic and social costs.[1,2]

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Abbreviations

ADHD	Attention deficit hyperactive disorder
EDS	Excessive daytime sleepiness
FDA	Food and Drug Administration
MSLT	Multiple sleep latency test
NREM	Non–rapid eye movement
OSA	Obstructive sleep apnea
PLMD	Periodic Limb Movement Disorder
PLMS	Periodic limb movement during sleep
PSG	Polysomnography or nocturnal polysomnography
REM	Rapid eye movement
RLS	Restless legs syndrome

This article addresses developmental aspects of sleep in children and adolescents, the assessment of sleep deprivation, counseling strategies, and evidence-based practice guidelines with regard to the evaluation and treatment of pediatric sleep disorders.

THE NORMAL DEVELOPMENT OF SLEEP

Whether a person is awake or asleep at any given time depends on the net balance between the circadian drive, which facilitates wakefulness, and the homeostatic drive, which facilitates sleep.[3] These processes interact to determine sleep quality, quantity, and timing. Developmental stages in physiologic, chronobiological, neurologic, and social/environmental factors impact the pattern of sleep in various ways.

Changes in the polysomnographic (PSG) assessment of sleep can be seen across the lifespan and evolve throughout the developmental years.[4] In a fetus, cyclical patterns of quiet sleep and active sleep have been identified and reflect non–rapid eye movement (NREM) and rapid eye movement (REM) sleep, respectively.[5] Quiet sleep presents as minimal movement with rhythmic breathing, whereas active sleep is associated with irregular breathing patterns, orofacial movements, and gross motor movements. Intermediate sleep is defined as sleep that cannot be distinctly identified as quiet sleep or active sleep.[6] Cerebral blood flow and metabolism are increased during active sleep.[7]

By weeks 32 to 34 after conception, cortical synaptic functioning continues to mature and a continuous PSG pattern is evident, with bursts of tracings being synchronized across the 2 hemispheres. At this point, 80% of sleep is active sleep and 20% is quiet sleep.[8] By week 40 after conception, active sleep comprises 50% of total sleep and is evident in neonates as periods of REM, notable motor activity, and periodic breathing with apneic episodes.[7] Quiet sleep in the neonate is observed as the child lying calmly with limited muscle tone, rhythmic respirations, and rare eye movements.[9] A neonate sleeps approximately 16 hours a day.[10]

In a 1-month-old infant, sleep progressively shifts toward night time. However, a 24-hour circadian rhythm is not yet present, and infants are unable to respond to external cues to regulate sleep cycles.[11] As the brain develops between ages 3 and 6 months, evidence of NREM sleep appears and a temporal pattern of sleep begins to form, with response to external cues.[11,12] NREM and REM patterns are divided evenly until about 6 months of age, after which REM sleep periods are more present in the later third of the night, resembling the pattern of adult sleep architecture.[13] By 6 months of age, infants sleep predominantly at night, with discrete naps during the day. Sleep onset at 6 months begins to occur through NREM as opposed to REM periods. REM periods exhibit muscle paralysis by 6 months of age.[12]