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ORIGINAL ARTICLE

Sleep Organisation and Hygiene in Childhood and Adolescence

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Abstract

Objective: The aim of this article is to describe normal aspects of sleep development throughout childhood and adolescence and to specify measures of sleep organization and hygiene that can be provided by the pediatrician when faced with a patient with troubles of sleep initiation or maintenance. **Methods:** A non-systematic review of the maturational physiological aspects of sleep was conducted and, in a non-systematic manner, a search in Medline database was run using the terms normal sleep, sleep development, sleep hygiene, adolescent sleep, extinction, and positive routines. **Results:** Troubles in initiating or maintaining sleep are common complaints among pediatric patients, and most cases have a behavioral and environmental origin. The pediatrician's knowledge of maturational physiological aspects of sleep and intervention measures is essential to their correct management and selection of the ideal individualized technique for each patient and family. **Conclusion:** A series of measures and sleep hygiene techniques are available and can be implemented by parents, under orientation and supervision of the pediatrician.

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INTRODUCTION

Sleep is a reversible physiological state with decreased responsiveness and interaction with external stimuli[1]. Despite reduced motor activity and consciousness, it is a state of extremely intense brain activity, involved in the processing of memory and learning as well as the growth and repair of several different tissues, thereby playing a crucial role in child development[1-3].

Sleep changes are thus associated with a higher risk of behavioral and cognitive changes, such as difficulties with attention, poor school performance, anxiety, and depression, in addition to excess weight and obesity[4-7].

Sleep disorders affect approximately 20%-30% of individuals between childhood and adolescence[2,8]. Most of these disorders arise from behavioral and non-endogenous factors, which should be identified and managed by the pediatrician[9]. This requires knowledge of the normal developmental patterns and sleep parameters as well as measures that can be implemented when sleep changes are found.

Therefore, the present article aims to describe the main characteristics of normal sleep development from childhood to adolescence and the measures of sleep hygiene and organization that can be recommended by the pediatrician.

NORMAL DEVELOPMENT OF SLEEP PATTERNS

Rudimentary sleep patterns and cycles can be observed prior to birth in fetuses, starting at around 26-28 weeks of gestational age[10]. They represent the initial stage of a maturation process that will continue during the first years of life and, more markedly, in the course of the first year after birth[10].

The newborn has an ultradian rhythm of sleep and wakefulness, which means that sleep and awakening relate to hunger and discomfort, rather than to the presence of daylight, with sleep periods lasting between 3 and 4 hours alternating with 50-60 minutes of wakefulness[3].

At this phase, sleep is initiated by its active stage, the precursor of rapid eye movement (REM) sleep, and represents 55%-60% of total sleep for a term newborn. From the third month onward, sleep begins with the non-REM (NREM) stage, and the previous polyphasic pattern changes toward longer daytime wakefulness[11].

Uninterrupted periods of sleep also increase during the first year of life: while a 2-week-old newborn sleeps approximately 4 uninterrupted hours, an infant aged 5-12 months sleeps approximately 7 hours. Between 6 and 9 months, nocturnal sleep is consolidated, and most infants sleep between 10 and 12 hours at night, plus 2 or 3 daytime naps, adding 2-4 hours to their total sleep in 24 hours[3].

At the end of the first year of life, the total sleep duration in 24 hours is reduced, especially at the expense of daytime sleep. However, a 1-year-old infant still sleeps approximately 50% of the time in 24 hours[3,12]. At this moment, NREM sleep represents approximately 70% of total sleep, and nocturnal awakenings may still occur (up to 2 times a night), as well as daytime naps[13]. Between 2 and 3 years of age, children have one or two daytime naps, not exceeding 2 hours in total, which should disappear after 5 years of age.

The American National Sleep Foundation (NSF) recommends that school-aged children sleep 9-11 hours, with a reduced need of 8-10 hours a day in adolescence[14]. At this stage, there is a delay in sleep pressure due to not only biological and hormonal changes but also social factors, leading to a difference in sleep duration and awakening time between weekdays and weekends or vacations[15,16]. Box 1 contains the sleep duration recommended by the NSF according to age[14].

SLEEP HYGIENE IN CHILDHOOD

To recommend sleep hygiene measures, pediatricians should obtain an appropriate clinical history concerning the sleep habits of the children and their families, including time, place, and usual rituals for the onset of sleep; awakening time; need, frequency, and time of daytime naps; and exposure to television, smartphones, and tablets during the day and night. Sometimes, keeping a sleep diary with this information recorded for approximately 2 weeks can help observe a pattern of family functioning that can be improved[17].

Sleep hygiene consists of daily practices, initiated during the day and lasting until the onset of sleep, that promote good quality sleep. As a result, they create a predictable, less stressful environment for the child, associated with better daytime behavior and even reduced maternal stress levels[18]. Sleep hygiene measures can be implemented at a very early age, around 6 months old, respecting the sleep maturation stage and not interfering with breastfeeding on demand.

When recommending sleep hygiene measures, pediatricians should consider the guidelines regarding child safety to prevent sudden infant death. According to the American Academy of Pediatrics, infants should be placed on their back and on a firm surface covered by a fitted sheet. The crib should be empty, without crib protectors and other bedding, cushions, or toys, to avoid suffocation. The use of pillows is also contraindicated.

Extreme temperatures should be avoided, especially overheating, which can result from excessive clothes and blankets and is associated with an increased risk of death. In addition, ideally until 12 months of age, but at least until 6 months of age, children should share the room, but not the bed, with their parents. The crib should be placed beside the mother, at a distance in which the mother can reach the child while lying[19].

Positive routines are essential to establish sleep hygiene and must be used alone or in conjunction with other approaches. The routines adopted by each family can vary depending on parents and children's preferences; they should, however, be consistent, and preparation for the onset of sleep

should start at the same time every day and have the same duration.

Routines should start 20-30 minutes before bedtime for younger children and 30-60 minutes for older children. They should consist of calm activities, such as reading or listening to or singing quiet songs, or talking about the children's day. Routines should start outside the children's room and finish inside it; e.g., dinner followed by showering, brushing teeth, putting on pajamas, and reading a story, the latter two in the bedroom.

During this period, the child should not engage in physical activities or exciting games, watch television, use tablets and smartphones, play video games, or even study[17]. The bed should not be associated with activities other than sleeping; thus, playing video games or playing in general in bed during the day should be discouraged. In addition, sleep should start in the children's bed, without their parents lying next to them. It should not start on the couch or in their parents' bed, so that children associate the onset of sleep with their own bed.

Transitional objects, such as dolls or blankets, can be used for children aged over 1 year. When children still take naps, they should end at least 4 hours before the usual bedtime for children who nap twice a day and 6 hours for children who nap once a day. Naps should not be too long because that could keep children still quite alert at bedtime. Older children and adolescents should not engage in physical activity 3 hours before bedtime[11,20,21].

Specifically among adolescents, a meta-analysis showed that sleep hygiene measures are responsible for speeding the onset of sleep, reducing latency, and increasing total sleep time. On the other hand, electronic games, smartphones, Internet or computers, and excessive nighttime lighting were associated with going to bed later in this age group. In addition, smoking and caffeine consumption were associated with shorter night sleep[22].

For children who wake up excessively during the night, parental intervention can be implemented to start sleeping again, and for those who have difficulty initiating sleep independently despite sleep hygiene measures, other interventions can be adopted. It is important to point out once more that the bedroom environment should be safe before implementing these measures[23].

Extinction procedures are the most used, especially in Anglo-Saxon countries[9]. The common denominator among all extinction procedures is the need to ignore the child's demands, in a more or less intense manner. Their application, especially unmodified extinction, can be hindered by various reasons, involving parents' tolerance for crying, practical issues (crying can disturb the sleep of other children in the house), fear that the bond with the child is harmed due to crying time, cultural differences, and parents' emotional and physical conditions (extremely tired or anxious parents may have difficulty tolerating the crying)[24]. Therefore, the procedure should be collectively chosen by the pediatrician and the parents.

1. Extinction procedures:[9,20,25]

Unmodified extinction: Children are put to sleep and their nocturnal behavior is ignored until the next morning, at the scheduled wake-up time.

Extinction with parental presence: It is mainly used when difficulty in sleeping is believed to be due to separation anxiety. It is similar to unmodified extinction but with the presence of a parent in the room during part of or the whole night. Parents can gradually move farther from the crib until they leave the room completely. Although the presence of a parent is reassuring for the child, the effects from this procedure usually take longer to show than those from unmodified extinction.

Graduated extinction: It consists of gradually increasing the time to respond to the child's demands during the night. A starting 5-minute wait is suggested, but it may be shorter, depending on the parents' tolerance for their children's crying. After the established time, the child should be checked on and comforted for short periods (ideally between 15 seconds and 1 minute), with little interaction.

Measures other than extinction procedures can be used in conjunction with positive routines:

Scheduled awakening[20,25]

This consists of waking the child 15-30 minutes before the usual nocturnal awakening time, leading to a reduction in spontaneous awakenings and, therefore, gradual reduction in scheduled awakenings.

Planned bedtime[9]

If the child does not fall asleep 30 minutes after the established time, they should be removed from the bed and engaged in a quiet activity until they become drowsy, after which they must return to bed.

Sleep restriction[25]

This consists of delaying bedtime until a moment in which the child is almost falling asleep to ensure that, once in bed, they go to sleep quickly. Once the habit is formed, bedtime should be gradually made earlier by 15-30 minutes, until the desired time is reached.

Relaxation techniques[17]

Relaxation strategies, massage, meditation, and diaphragmatic breathing can help children fall asleep.

Cognitive restructuring[17,26]

This includes identifying inappropriate thoughts related to bedtime, such as "I can't sleep," challenging them (e.g., thinking "yesterday you managed to sleep"), and replacing them with more realistic thoughts such as "it might take a while, but I always get to sleep."

The time until the effects become apparent varies from child to child and depends on the selected procedure. The key to good results is persistence and consistency in the application of the interventions. Parents should reinforce positive behavior in their children by praising them. If they wish, children themselves can make a poster to mark the nights in which they behaved well.

CONCLUSION

The implementation of sleep hygiene measures, alone or combined, is important to promote quality sleep during childhood. The main challenge in implementing these measures is the fact that they involve changes in the routines and habits of not only the children but also the entire family. The pediatrician needs to be familiar with the available procedures in order to select, together with parents, the most appropriate ones for each patient and provide support for their continuity despite potential difficulties.

REFERENCES

1. Davis KF, Parker KP, Montgomery GL. Sleep in infants and young children: Part one: normal sleep. J Pediatr Health Care. 2004;18(2):65-71.
2. Honaker SM, Meltzer LJ. Sleep in pediatric primary care: A review of the literature. Sleep Med Rev. 2016;25:31-9.
3. McLaughlin Crabtree V, Williams NA. Normal sleep in children and adolescents. Child Adolesc Psychiatr Clin N Am. 2009;18(4):799-811.
4. Field T. Infant sleep problems and interventions: A review. Infant Behav Dev. 2017;47:40-53.
5. Mindell JA, Leichman ES, DuMond C, Sadeh A. Sleep and Social-Emotional Development in Infants and Toddlers. J Clin Child Adolesc Psychol. 2017;46(2):236-46.
6. Halal CS, Matijasevich A, Howe LD, Santos IS, Barros FC, Nunes ML. Short Sleep Duration in the First Years of Life and Obesity/Overweight at Age 4 Years: A Birth Cohort Study. J Pediatr. 2016;168:99-103.e3.
7. Lam P, Hiscock H, Wake M. Outcomes of infant sleep problems: a longitudinal study of sleep, behavior, and maternal well-being. Pediatrics. 2003;111(3):e203-7.
8. Blader JC, Koplewicz HS, Abikoff H, Foley C. Sleep problems of elementary school children. A community survey. Arch Pediatr Adolesc Med. 1997;151(5):473-80.
9. Nunes ML, Bruni O. Insomnia in childhood and adolescence: clinical aspects, diagnosis, and therapeutic approach. J Pediatr (Rio J). 2015;91(6 Suppl 1):S26-35.
10. Dauvilliers Y, Billiard M. Aspects du sommeil normal. EMC-Neurologie. 2004;1(4):458-80.
11. Nunes ML, Cavalcante V. Avaliação clínica e manejo da insônia em pacientes pediátricos. J Pediatr (Rio J). 2005;81(4):277-86.
12. Iglowstein I, Jenni OG, Molinari L, Largo RH. Sleep duration from infancy to adolescence: reference values and generational trends. Pediatrics. 2003;111(2):302-7.
13. Bruni O, Baumgartner E, Sette S, Ancona M, Caso G, Di Cosimo ME, et al. Longitudinal study of sleep behavior in normal infants during the first year of life. J Clin Sleep Med. 2014;10(10):1119-27.
14. Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, DonCarlos L, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. 2015;1(1):40-3.
15. Crowley SJ, Acebo C, Carskadon MA. Sleep, circadian rhythms, and delayed phase in adolescence. Sleep Med. 2007;8(6):602-12.
16. Gradisar M, Crowley SJ. Delayed sleep phase disorder in youth. Curr Opin Psychiatry. 2013;26(6):580-5.
17. Meltzer LJ, Mindell JA. Nonpharmacologic treatments for pediatric sleeplessness. Pediatr Clin North Am. 2004;51(1):135-51.
18. Mindell JA, Telofski LS, Wiegand B, Kurtz ES. A nightly bedtime routine: impact on sleep in young children and maternal mood. Sleep. 2009;32(5):599-606.
19. Task Force on Sudden Infant Death Syndrome, Moon RY. SIDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleeping environment. Pediatrics. 2011;128(5):1030-9.
20. Galland BC, Mitchell EA. Helping children sleep. Arch Dis Child. 2010;95(10):850-3.
21. Skuladottir A, Thome M, Ramel A. Improving day and night sleep problems in infants by changing day time sleep rhythm: a single group before and after study. Int J Nurs Stud. 2005;42(8):843-50.
22. Bartel KA, Gradisar M, Williamson P. Protective and risk factors for adolescent sleep: a meta-analytic review. Sleep Med Rev. 2015;21:72-85.
23. Morgenthaler TI, Owens J, Alessi C, Boehlecke B, Brown TM, Coleman J Jr, et al.; American Academy of Sleep Medicine. Practice parameters for behavioral treatment of bedtime problems and night wakings in infants and young children. Sleep. 2006;29(10):1277-81.
24. Etherton H, Blunden S, Hauck Y. Discussion of Extinction-Based Behavioral Sleep Interventions for Young Children and Reasons Why Parents May Find Them Difficult. J Clin Sleep Med. 2016;12(11):1535-43.
25. Halal CS, Nunes ML. Education in children's sleep hygiene: which approaches are effective? A systematic review. J Pediatr (Rio J). 2014;90(5):449-56.
26. Tisser L, Nunes ML. Por que não gosto da hora de dormir? Crianças entendendo por que é importante dormir. Porto Alegre: Editora Sinopsys; 2015.