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Sleep disorders in children: a pediatric dentist's perspective

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Abstract

Sleep in children is a crucial and dynamic process, affecting numerous aspects of health and development. Problems with sleep are relatively common but are often challenging to acknowledge. The foremost common sleep disordered breathing (SDB) in children is obstructive apnea (OSA). One among the most causes of childhood SDB is enlargement of the tonsil tissues and, in most cases, their removal is an ultimate treatment of SDB. Several risk factors linked to the event of OSAS and other sleep breathing disorders are typical of the Pediatric age. The concept of this paper is to research the state of the art on this specific topic, discussing its implications in terms of diagnosis and management focusing onto its oral aspects.

Keywords: Sleep Disordered Breathing (SDB), Obstructive Sleep Apnoea (OSA), Children, paradoxical sleep, insomnia.

Introduction

Sleep in infants, children, and adolescents could be a dynamic and important process. The event of sleep parallels physical, behavioral, and neurologic development, and there are key reciprocal relationships between these aspects of development. As our understanding of sleep in children continues to evolve, it's become evident that the event of latest diagnostic and therapeutic approaches must be paralleled by increased awareness of sleep problems among medical also as dental practitioners.[1]

Sleep is an important physiological drive. The typical child spends almost one-half of his or her life asleep. Breathing disorders during sleep or sleep disordered breathing (SDB) can cause significant health problems that are related to a high morbidity and a high risk of mortality.

Changes In Respiration During Sleep – Differences Between Children And Adults

We all breathe better awake than asleep. During sleep, there's a decrease in minute ventilation. In adults, minute ventilation decreases by approximately 13–15% compared with the worth during wakefulness; rate of respiration tends to stay constant and therefore the decrease is due primarily to a decrease in tidal volume. In contrast, studies of infants, children, and adolescents have shown that the rate of respiration decreases during sleep. The functional residual capacity (FRC) decreases with sleep, and upper airway resistance doubles. The ventilatory drive decreases, particularly during rapid eye movement (REM) sleep. paradoxical sleep is additionally related to a decrease in inter-costal and upper airway muscular tonus. Thus, breathing is impaired during sleep compared with wakefulness, and is further impaired during paradoxical sleep .[2] The way children with SDB present is different than in adults. Children tend to possess fewer night time symptoms since their obstructive spells are susceptible to be brief and periods of arousal less obvious. Likewise, they present with subtler behavioral changes within the daytime and don't have the degree of daytime somnolence seen in adults.[2]

Etiology

The pathophysiology of SDB in children is analogous thereto seen in adults. During sleep, the ventilatory drive and upper airway muscular tonus decrease. The inspiratory force collapses the pharyngeal airway that's already narrowed from other anatomic causes. The collapse of the pharyngeal airway results in partial airway obstruction producing hypopnea, or total airway obstruction leading to apnea. Apneic and hypopneic events are terminated by arousals, during which natural defense mechanisms, the pharyngeal dilators, are activated. the entire cycle may repeat itself when the kid returns to a deeper sleep stage with decreased ventilatory drive and upper airway muscular tonus.[2]

Sleep duration requirements vary widely in infancy, with ranges that gently decrease and narrow with age. The diurnal biological time begins to develop early in infancy, and undergoes a “phase delay” during adolescence, causing a predilection toward later sleep and wake times.[2]

Table 1: Recommended Sleep Times for Infants and Children

Age	Recommended Total Sleep Time
4-12 months	12-16 hours
1-2 years	11-14 hours
3-5 years	10-13 hours
6-12 years	9-12 hours
13-18 years	8-10 hours

Paruthi et al [3]

Disorders of sleep

Sleep-Disordered Breathing

Sleep-related breathing concerns are among the foremost common reasons for referral to sleep clinics. Typically, these referrals are prompted by snoring or witnessed apneas. Adenotonsillar hypertrophy within the setting of daytime symptoms of sleepiness, inattentiveness, and behavioral or academic problems can also prompt a referral.[1]

Obstructive sleep apnea

In OSA, snoring is the commonest symptom, and youngsters are less likely to exhibit dramatic pauses in breathing than adults. Sleep apnea is defined as a composite index of number of apneas (cessation of airflow) and hypopneas (decreases in airflow that affect sleep continuity and/or oxygen saturation) per hour. this is often called the apnea-hypopnea index (AHI).[1]

Central sleep apnea

Central apnea (CSA) occurs when there's an interruption in breathing without evidence of associated respiratory effort.[1]

Catathrenia

Catathrenia, or expiratory moaning in sleep, is taken into account a traditional variant and should be mistaken for sleep-disordered breathing. Polysomnography may be required to form this distinction.[1]

Insomnia

Insomnia is among the foremost common sleep complaints in children, with prevalence estimates ranging as high as 20% to 30%.20 Insomnia includes difficulty with sleep initiation, maintenance, or early waking that happens despite adequate age-appropriate opportunity for sleep, leading to daytime impairment for the kid or family. Sleep latency could also be normal during this case, but repetitive awakenings are common.[1]

Parasomnias

Parasomnias are undesirable behaviors that occur during sleep, often related to sleep-wake transitions.[1]

Table 2: Summary of Common Sleep Disorders in Children[4]

Sleep disorder	Epidemiology	Clinical features	Diagnostic criteria	Treatment options
Obstructive sleep apnea	The prevalence ranges from 1% to 5%.Between the ages of 2 and 8, the disease appears. More common in blacks and those with craniofacial anomalies, Down syndrome, etc	Snoring Sleeping in unusual positions Paradoxical breathing during sleep Enuresis or diaphoresis at night Headaches in the Morning Problems with cognition and behavior, Excessive drowsiness during the day (less common) Tonsils and adenoids enlargement Pectus excavatum	For diagnosis, a PSG is required (apnea-hypopnea index greater than 1.5 per hour)	Adenotonsillectomy is the first line of treatment. Continuous positive airway pressure, nasal steroids, and fast maxillary expansion are some of the other options (i.e., orthodontic device widens the upper jaw)
Parasomnias Sleepwalking (somnambulism)	Prevalence: 17% in children, 4% in adults Peaks between 8 and 12 years of age Commonly seen in males	Ambulation when sleeping Confusion/agitation Behaviours that are unusual or dangerous Confusional arousals and/or sleep terrors	By history taking There is no need for PSG.	Reassurance (usually resolves spontaneously) Awakenings on time Safety advice for the bedroom and the house Precipitating factors are being investigated Benzodiazepines

Confusional arousals	Prevalence: 17.3 percent in children aged 3 to 13, and 2.9 percent to 4.2 percent in those aged 15 and over. Both men and women are affected equally.	"Sleep drunkenness" Slow response time Speech slurred	By history taking There is no need for PSG.	Reassurance (usually resolves spontaneously) Awakenings on time Safety advice for the bedroom and the house
Sleep terrors	Prevalence: Children's rates range from 1% to 6.5 percent, while adults' rates are 2.2 percent. Onset = early childhood Affects males and females equally	Extremely frightened (e.g., screaming, crying, confusion, walking) It's difficult to get out of this episode. It usually happens in the initial half of the sleep cycle. There is a lot of overlap with other parasomnias.	By history taking There is no need for PSG.	Reassurance (usually resolves spontaneously) Sleep for longer periods of time Awakenings on time Safety advice for the bedroom and the house Benzodiazepines
Nightmares	Prevalence: In 3- to 5-year-olds, the prevalence ranges from 10% to 50%. It begins between the ages of three and six and peaks between	Dreams that aren't pleasant Sympathetic reaction increases Reluctance to sleep increases during the second half of the sleep phase, with clear memories of the experience. It's possible that it's linked to mood disorders	By history taking There is no need for PSG.	Confirmation (usually resolves spontaneously) Awakenings on time Safety advice for the bedroom and the house Cognitive behavioural therapy (CBT) is a type of therapy Anti-sleep medications that prevent rapid eye movement (REM) sleep (selective serotonin reuptake inhibitors; off-label use)

	the ages of six and ten. Males and females are both affected.	or post-traumatic stress disorder.		
Behavioral insomnia of childhood	Prevalence: 10% to 30% Affects males and females equally	*Sleep-onset association type:* Difficulty falling asleep or staying asleep when sleep-specific variables are not present Frequently waking up in the middle of the night is a regular occurrence. *Limit-setting type:* Having trouble falling asleep or staying asleep Refusal to go to bed or stalling	By history taking There is no need for PSG.	Techniques like as prevention, parental education, and extinction are beneficial.
Delayed sleep phase disorder	Prevalence: In adolescents, the prevalence ranges from 7% to 16%. It begins in adolescence and peaks in the early twenties. Unclear gender prediliction 40% of people who are affected have a family history	Sleeping and getting up at socially appropriate times is difficult (at least a two-hour delay) "Night owl"	by history taking For at least 1 week, use a sleep diary and/or actigraphy PSG is not required.	Sleep hygiene education Observe a regular sleep-wake cycleBefore going to bed, stay away from bright lights. Melatonin (0.3 to 5 mg) should be taken 1.5 to 6.5 hours before bedtime. For the first 1 to 2 hours after waking up, bright light therapy at 2,000 lux is recommended. Sleep logs should be used to track progress indefinitely.

	of the disease.			
Restless legs syndrome	Prevalence: 2% based on limited studies More common in women; unknown if it is more common in boys or girls Family history: Early onset associated with primary restless legs syndrome (genetic)	The desire to move one's legs is accompanied by discomfort. Usually starts in the evening, gets worse with rest, and gets better with movement. Negative behaviour and mood are linked to poor cognition and attention. Attention - deficit /hyperactivity disorder sufferers have a higher prevalence.	By history taking PSG may be recommended. When a kid is unable to define his or her symptoms, a diagnosis can be made based on the history and the presence of at least two of the following: A sleep disruption, or five or more periodic limb movements per hour of sleep during PSG are all signs of PSG.	Nicotine and caffeine abstinence Discontinue any medications that are causing problems (antihistamines, selective serotonin reuptake inhibitors, and tricyclic antidepressants) If ferritin level is less than 50 mcg per L, iron replenishment is recommended; reassess after 3 months.Levodopa, dopamine agonists, gabapentin (Neurontin), opioids, and benzodiazepines are used in severe situations (all off-label uses)

PSG = Polysomnography

Treatment options in the treatment of SDB[2]

Non- Surgical	Surgical
Treatment of nasal allergy	Adenotonsillectomy (AT)
Treatment of acute inflammation	Uvulopalatopharyngoplasty (UPPP)
Continuous Positive Airway Pressure (CPAP)	Revision of posterior pharyngeal flap
Weight Reduction	Distraction Osteogenesis
Sleep hygiene (Sleep modification)	Tracheotomy

Role of Pediatric Dentist[5]

There are 3 main ways dentists can gather information related associated with SRBDs: (1) patient interview and screening, (2) clinical examination, and (3) observances during dental treatment.

Patient Interview and Screening

The initial examination provides a perfect opportunity for uncovering risk factors related to Pediatric OSA. Direct questioning about history of PSG or treatment for sleep disorders is one method of obtaining information. Asking the parent to finish a health history form during which they'll select sleep-disordered breathing, like snoring or OSA, from an inventory of medical conditions is another approach.

A screening instrument referred to as BEARS (B= Bedtime, E= Excessive Daytime Sleepiness, A = Night Awakenings, R = Regularity and duration of sleep, S 5 Snoring) has been utilized in medical care settings to realize more information about sleep.

Clinical Examination

A detailed clinical examination may prompt medical referrals if a Pediatric SRBD is suspected, including information from the patient interview, patients with venous pooling beneath the eyes or a characteristic long adenoid facies may warrant further evaluation.

Dry lips and erythematous and edematous maxillary gingiva are possibly associated with already dark mouth breathing. Maxillary constriction, narrow or V-shaped palate, low tongue posture, ankyloglossia, and retroglossal airway narrowing are related to OSA within the Pediatric population. Retrognathic profile, excessive overjet, and posterior cross-bite may indicate airway issues.

Observances During Dental Treatment

Dental treatment is another opportunity for dental practitioners to acknowledge potential sleep-related breathing problems. The airway is usually well visualized while the patient is during a semi-reclined position during dental treatment. The dentist can observe a patient's ability to breath freely through the nose during dental procedures. Use of a pre-tracheal stethoscope is useful for identifying air movement and alerting the practitioner to airway obstruction.

Orthodontic Treatments In Children With SDB[2]

Oral Appliances: Oral appliances, which are provided primarily by dentists, became increasingly popular within the past few years for treatment of OSA. Oral appliances are of particular interest to people that opt to not have surgery and can't tolerate continuous positive airway pressure treatment.

Rapid Maxillary Expansion (RME): RME is an orthodontic procedure that uses a hard and fast appliance with an expansion screw anchored on selected teeth. It's aimed toward skeletal expansion of the upper jawbone by the appliance of orthopedic force to the mid-palatal suture leading to maxillary widening. Children with OSA who have maxillary contraction, no adenotonsillar hypertrophy, and a body mass index < 24 kg/m2 are considered to possess the foremost favorable response to RME.

Oropharyngeal Exercises (Myofunctional Therapy): Oral exercises are reported to possess a positive impact on SRBD. Oral breathing influences palatal development in growing children. Underdeveloped midface, transverse maxillary deficiency, and palatal constriction are commonly related to children who are oral breathers.

Is This Medicine, Dentistry, Or Does It Matter?[6]

Medicine is severely compartmentalised, undermined by specialities that specialise in small areas of human health and disease. Little emphasis is dedicated to prevention and other physiology-spanning techniques. Dentists, who are limited to a few specialties, are more generalists who are responsible for the overall health of the patient. Dentists have always placed constraints when looking outside the mouth.

As clinical experience and research projects have shown, airway disorders affect much more than sleep, the term "dental sleep medicine" is becoming increasingly obsolete. Mouth-related solutions aren't off-the-shelf "fittings," but rather totally personalised medical gadgets that can cause injury as well as provide healing.

Meanwhile, tens of thousands of dentists are responsible for doing SRBD screenings on their patients. Many people are becoming aware of the importance of good sleep breathing. With a burgeoning consumer sleep technology business capable of leading any interested participant along the path to a more open airway during sleep, resolving simple symptoms such as snoring and daytime sleepiness has never been easier.

Education in Sleep Medicine[7]

For dentists, the top layer of the educational pyramid would require two components (fig 1). It may first necessitate enrollment in an interdisciplinary sleep

programme at a university-based school of medicine. Passing an independent and approved exam would be the second component of top-tier education. Training, experience, and testing from several university-based specialised dental programmes, including rotations at medical sleep centres, provide the next level of experience within the educational pyramid. The training and education of dentists in the field of sleep medicine is at an all-time low.

A "weekend warrior" education in sleep medicine, or even a year-long, 3-5 weekend, university-based mini-residency, is not a substitute for official training, but it is far superior to industry-sponsored education. The reasoning for this is that university-based mini residency programmes are more likely to be associated with actual sleep experts who can provide unbiased education.

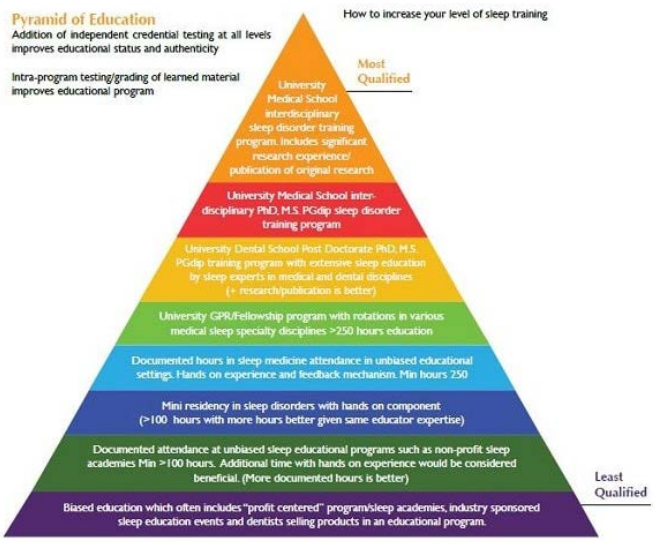

Fig.1: Education in sleep medicine

Ref: https://dentalsleeppractice.com/education-sleep-medicine/

Conclusion

Sleep is essential for physiologic, emotional, and neurocognitive growth. We urge that parents be questioned if they have any sleep concerns, whether their child snores, and if their child wakes up looking rested at every general check-up. Breathing-related sleep difficulties in children may not only be a source of craniofacial growth abnormalities, which is of dental concern, but they may also have an impact on the child's overall health and development.

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