Available online at https://www.mmpubl.com/ijpedorehab

International Journal of Pedodontic Rehabilitation

Review Article

Little snores, big concern: A review on pediatric obstructive sleep apnoea

Vani B[1], Navneet A[2], Gaurav M[3], Ganga D[4], Deepak S[5], Srishti J N[6]

[1,6] Postgraduate student, [2]Professor & HOD, [3, 4]Reader, [5]Senior Lecturer
Department of Paediatric & Preventive Dentistry, Index Institute of Dental Sciences, Malwanchal University
Indore, Madhya Pradesh, India

***How to cite: Aravind et** al, Little snores, big concern: A review on pediatric obstructive sleep apnea. Int J Pedo Rehab 2023; 8(2):60-66*

DOI: https://doi.org/10.56501/intjpedorehab.v8i2.929

Received :03/11/2023 *Accepted: 31/12/2023* *Web Published: 05/01/2024*

ABSTRACT

Context (Background): Pediatric obstructive sleep apnoea (OSA) is a pressing concern, with profound consequences for children's development. This review delves into the epidemiology, pathophysiology, diagnosis, treatment, and complications of pediatric OSA.

Aims: Our goal is to provide a complete overview of the present knowledge about pediatric OSA. By synthesizing the latest research findings, we highlight the importance of understanding this sleep disorder's impact on children.

Methods and Materials: We conducted an exhaustive search of English-language publications from various databases, including PubMed and Google Scholar, covering studies, clinical trials, and review articles on pediatric OSA.

Conclusions: This review underscores the multifaceted nature of pediatric OSA, emphasizing its effects on children's health. Accurate diagnosis is crucial, as untreated OSA can lead to cognitive and cardiovascular issues. While current treatments, such as adenotonsillectomy and positive airway pressure therapy, show promise, ongoing research is necessary to refine diagnostics and explore innovative treatments.

Keywords: *Continuous Positive Airway Pressure (CPAP), Apnea- Hypnea Index (AHI), Adenotonsillectomy, Adenoid Faces.*

Address for Correspondence:
Dr. Vani Bais
Postgraduate student, Department of Pediatric and Preventive Dentistry, Malwanchal University
Index Institute of Dental Sciences, Indore (M.P.)
Email: baisvani97@gmail.com

INTRODUCTION

An Irish proverb states that ‘A good laugh and a long sleep are the best cures in the doctor’s book." Sleep is considered a fundamental necessity for normal development in childhood. Sleep in humans serves several important functions, including promoting optimal brain growth and development, improving learning, attention, memory, and synaptic efficiency, regulating various aspects of emotional and physical health such as appetite, body weight, and emotions, strengthening the immune system, and allowing the brain to clear cellular debris and neurotoxins. Sleep problems are common among children. Sleep problems are prevalent in children, with some issues resolving as they grow, while persistent problems might indicate a sleep disorder. Recent research indicates that childhood sleep problems could potentially foreshadow sleep issues in adulthood.

The most prevalent type of sleep-disordered breathing is obstructive sleep apnea. Obstructive sleep apnea (OSA) was first reported in children by Guilleminault et al. (1976). Obstructive sleep apnea is an entity that has gained much importance in the present era. OSA is a breathing disorder marked by periods of whole or partial obstruction of the upper airways during sleep. These episodes frequently lead to irregularities in gas exchange and arousal that disturb sleep.[1] It is crucial to highlight that the clinical presentation of pediatric OSA differs from that of adult OSA due to several aspects related to development, physiology, and maturation that affect breathing and sleep patterns in children.[2] It is currently recognized as a worldwide issue. The illness can arise at any age and affect one to five percent of children, however, it may be more common in children between the ages of two and seven.[3,4,5]

MATERIAL & METHODOLOGY:

We searched Google Scholar, Medline, and PubMed for relevant literature. Articles written in languages other than English were not included. The databases were searched using terms such as polysomnography, continuous positive airway pressure, and pediatric obstructive sleep apnoea. The study comprised articles based on reviews, cross-sectional studies, and case reports.

ETIOPATHOGENESIS:

Given that the etiology of Paediatric Obstructive Sleep Apnea is complex, alterations in the upper airway's overall cross-sectional area and the compliance of its muscles are expected to be the overall effect. Upper airway obstruction during sleep could also be caused by abnormalities such as tonsil and adenoidal hypertrophy, choanal atresia, micrognathia, thin palatal arch, dolicho-facial pattern, macroglossia, and retrognathia.[6,7]

The pathophysiology of OSA in children is a complicated interplay between neuromuscular compensation and an airway that is prone to collapse. The soft tissue and craniofacial structures determine the size of the pediatric airway. Any combination of adenotonsillar hypertrophy, mandible hypertrophy, or maxilla hypertrophy that results in increased upper airway resistance predisposes a child to OSA.

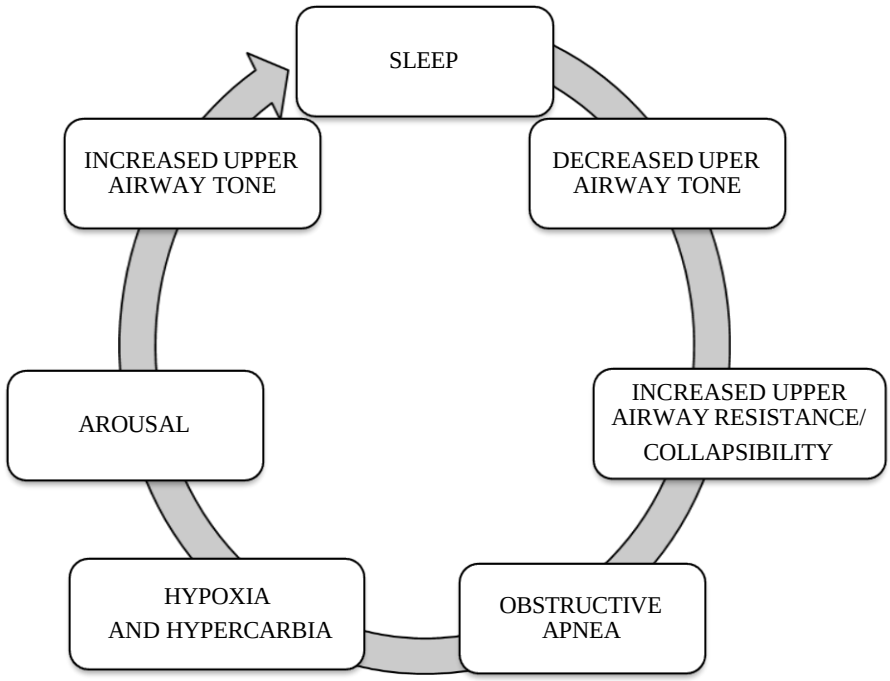

Figure 1: shows pathophysiology of pediatric obstructive sleep apnea

CLASSIFICATION

In most national and international guidelines and healthcare standards, the most commonly used metric to characterize pediatric OSA and describe its severity is the number of apnea and hypopnea per hour of sleep, or the apnea-hypopnea index (AHI).[8] Based on a classification and assessment system, the severity of pediatric OSA might vary from mild to severe.

- Mild obstructive sleep apnea means that the AHI is between 5 and 15.
- Moderate obstructive sleep apnea means that the AHI is between 15 and 30.
- Severe obstructive sleep apnea means that AHI is greater than 30 (more than 30 episodes per hour).

CLINICAL FEATURES-

In pediatric patients, obstructive sleep apnea can present with both daytime and nighttime symptoms. Frequent snoring, dry mouth, forced oral breathing, irregular thoracic and/or abdominal movements, enuresis, restless sleep with breathing pauses, awakenings, and position changes, as well as perspiration, are examples of nocturnal symptoms. Symptoms that manifest during the day include nasal breathing issues, headaches in the morning, hyperactivity and/or irritability, poor academic performance, sleepiness (which is more common in obese children and adolescents), reduced structural development, and cardiovascular consequences.

OROFACIAL CHANGES IN PAEDIATRIC OBSTRUCTIVE SLEEP APNEA

According to the functional matrix theory established by Moss in 1969, normal respiratory function of the nose is essential for the balanced growth of craniofacial structures.[9] Mouth breathing will negatively impact growing children's overall health as well as the dentofacial complex's normal growth and function if upper airway obstruction is not swiftly addressed. The potential impact of respiratory issues associated with sleep on the growing teeth has received little investigation. individuals with unique craniofacial features, such as macroglossia, bruxism, crossbite, retrognathic mandible, small maxilla, deeper palatal height, and adenoidal face.

DIAGNOSIS

Diagnosing pediatric OSA requires a multidisciplinary approach involving medical history assessment, physical examination, and specialized sleep studies. During the assessment of the pediatric patient, it is crucial to gauge both the quantity and quality of their sleep. Although there isn't a commonly accepted screening method for pediatric OSA, recommendations state that doctors should always ask about the quantity and quality of their patient's sleep as well as check for snoring.

The initial airway assessment starts with a good history. Indicators of a potentially problematic airway are sought out through questions. Any history of previous trauma or surgery to the airway or surrounding structures, as well as any use of anesthetics in the past, would fall under this category. Asking about recent or present symptoms of an upper respiratory infection (URI), such as hoarseness, breathing difficulties, feeding difficulties, difficulty speaking, and noisy breathing, is also recommended. Children with obstructive sleep apnea may be identified with the use of questions like those concerning snoring in the past, daytime sleepiness, or stopping breathing during sleep. The health care provider should always evaluate the patient's capacity to align and visualize the oro-pharyngeal laryngeal axes during a physical examination of the airways.

A sleep habit questionnaire is administered following a clinical examination and history. This is a subjective questionnaire designed to collect data from parents or carers regarding their child's sleeping patterns and behaviors. The questionnaire inquires about several symptoms connected to sleep that are frequently linked to open airway syndrome (OSA), including gasping for air, snoring, restless sleep, and excessive daytime sleepiness. It supports the identification of at-risk children, offers crucial information on symptoms, directs treatment choices, and facilitates progress tracking. Children can take advantage of a variety of sleep habit questionnaires and examinations. A few commonly used ones are the Paediatric Sleep Questionnaire (PSQ)[10], the Children's Sleep Habits Questionnaire (CSHQ)[11], the Sleep Disturbance Scale for Children (SDSC)[12], and the Paediatric Airway Assessment Questionnaire.[13] Specialised sleep studies such as overnight pulse oximetry and home sleep apnea testing (HSAT), polysomnography, drug-induced sleep endoscopy (DISE), and a cine magnetic resonance imaging (MRI) sleep study are performed to confirm the condition of pediatric obstructive sleep apnea.

MANAGEMENT

A multidisciplinary approach is necessary for the management of individuals with OSA, and there is currently a wide range of therapy options available. Individualized treatment plans are based on the results of a thorough assessment, which includes sleep study results, dysfunction during the day, disturbance of sleep at night, and physical examination results. The child's age, clinical symptoms (such

as dysfunction during the day or night), the presence of comorbidities (particularly underlying genetic, craniofacial, and neuromuscular disorders), risk factors (such as obesity, crowded oropharynx), and the results of PSG, if conducted, all play a role in the decision to start treatment and the course of treatment that is chosen.

Many different treatment options depend on the severity of the OSA. These include both surgical and non-surgical interventions.

1. Surgical Therapies

2. Non-Surgical Therapies

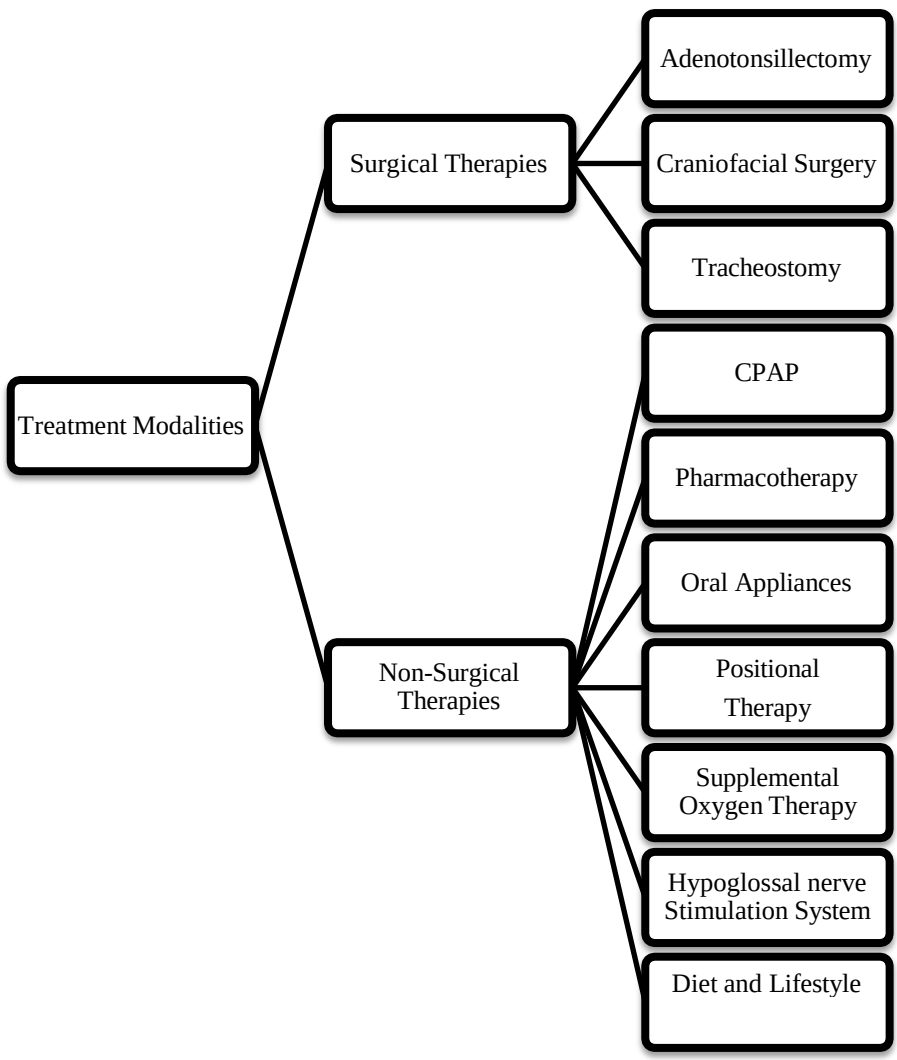

Figure 2: shows management of pediatric obstructive sleep apnea

1. SURGICAL THERAPIES

The major goal of surgery in children with obstructive sleep apnea (OSA) is to locate and remove the source of the upper airway obstruction, effectively expanding the airway. The recommended initial surgical approach for children with adenotonsillar hypertrophy is adenotonsillectomy, involving the removal of the adenoids and palatine tonsils, common lymphoid tissues in the upper airway. The American Academy of Paediatrics and the American Academy of Otolaryngology Head and Neck Surgery both approve this technique, which has an 80% success rate in treating pediatric OSA.[14] Additionally, craniofacial surgery, particularly distraction osteogenesis, is employed to address craniofacial deformities without bone grafting.[15] In cases of severe, treatment-resistant OSA with significant hypoxemia, tracheostomy, involving the creation of a tracheal opening for long-term ventilation, is considered the most definitive treatment option.

2. NON-SURGICAL THERAPIES

Continuous Positive Airway Pressure (CPAP) is recognized as the gold standard treatment, providing a non-invasive strategy to control OSA.[16] Pharmacotherapy, including anti-inflammatory medications like intranasal corticosteroids and montelukast, is considered for mild to moderate cases.[17] To reduce airway collapse during sleep, oral appliances such as tongue-retaining devices (TRDs) and mandibular advancement devices (MADs) are increasingly being prescribed.[18] Supplemental oxygen therapy is mentioned as a treatment option for infants with OSA.[19] The Hypoglossal Nerve Stimulation (HGNS) system is noted as a safe and effective treatment for moderate to severe OSA in adults.[20] Positional therapy is suggested as an effective secondary or supplemental therapy for OSA. The paragraph concludes by emphasizing the importance of diet and lifestyle modifications in managing pediatric OSA.

CONCLUSION

Early identification and intervention for pediatric obstructive sleep apnea are essential for mitigating its adverse effects on children's physical and cognitive development. Ongoing research continues to enhance our understanding and treatment of this condition, ultimately improving the quality of life for affected children.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICTS OF INTEREST

There are no conflicts of interest

REFERENCES

1. American Academy of Sleep Medicine (2014). International Classification of Sleep Disorders, 3rd ed. Darien, Ill.: American Academy of Sleep Medicine: 63-8.
2. Alsubie, H. S., & BaHammam, A. S. (2017). Obstructive sleep apnoea: Children are not little adults. Paediatr Respir Rev, 21, 72-9.
3. Marcus, C. L., Brooks, L. J., Draper, K. A., et al. (2012). Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics, 130(3), 576-84.

4. Lumeng, J. C., & Chervin, R. D. (2008). Epidemiology of pediatric obstructive sleep apnea. Proc Am Thorac Soc, 5(2), 242-52.
5. Bixler, E. O., Vgontzas, A. N., Lin, H. M., et al. (2008). Sleep-disordered breathing in children in general anesthesia. Am Thorac Soc, 5(2), 242-52.
6. Huynh, N. T., Emami, E., Helman, J. I., & Chervin, R. D. (2014). Interactions between sleep disorders and oral diseases. Oral Dis, 20(3), 236-245.
7. Katz, E. S., & D'Ambrosio, C. M. (2008). Pathophysiology of pediatric obstructive sleep apnea. Proceedings of the American Thoracic Society, 5(2), 253-62.
8. Pevernagie, D. A., Gnidovec-Strazisar, B., Grote, L., et al. (2020). On the rise and fall of the apnoea-hypopnea index: a historical review and critical appraisal. J Sleep Res.
9. Moss, M. L. (1971). Neurotrophic processes in orofacial growth. J Dental Res, 50, 1492–9.
10. Chervin, R. D., Hedger, K., Dillon, J. E., & Pituch, K. J. (2000). Pediatric sleep questionnaire (PSQ): validity and reliability of scales for sleep-disordered breathing, snoring, sleepiness, and behavioral problems. Sleep Medicine, 1(1).
11. Goodlin-Jones, B. L., Sitnick, S. L., Tang, K., Liu, J., & Anders, T. F. (2008). The Children's Sleep Habits Questionnaire in toddlers and preschool children. Journal of Developmental & Behavioral Pediatrics, 29(2), 82-8.
12. Bruni, O., Ottaviano, S., Guidetti, V., Romoli, M., Innocenzi, M., Cortesi, F., & Giannotti, F. (1996). The Sleep Disturbance Scale for Children (SDSC): Construction and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. Journal of sleep research, 5(4), 251-61.
13. Friedman, M., Tanyeri, H., La Rosa, M., et al. (1999). Clinical predictors of obstructive sleep apnea. Laryngoscope, 109(12), 1901-7.
14. Brigger, M. T., & Brietzke, S. E. (2006). Outpatient tonsillectomy in children: a systematic review. Otolaryngol Head Neck Surg, 135, 1–7.
15. Brietzke, S. E., & Gallagher, D. (2006). The effectiveness of tonsillectomy and adenoidectomy in the treatment of pediatric obstructive sleep apnea/hypopnea syndrome: a meta-analysis. Otolaryngol Head Neck Surg, 134(6), 979–984.
16. Sullivan, C., Berthon-Jones, M., & Issa, F. (1983). Nocturnal nasal-airway pressure for sleep apnea. N Engl J Med, 309, 112.
17. Friedman, B. C., & Goldman, R. D. (2011). Anti-inflammatory therapy for obstructive sleep apnea in children. Can Fam Physician, 57, 891–893.
18. Lim, J., Lasserson, T. J., Fleetham, J., & Wright, J. J. (2006). Oral appliances for obstructive sleep apnoea. Cochrane database of systematic reviews, (1).
19. Ramgopal, S., Kothare, S. V., Rana, M., Singh, K., & Khatwa, U. (2014). Obstructive sleep apnea in infancy: a 7-year experience at a pediatric sleep center. Pediatr Pulmonol, 49(6), 554–560.
20. Diercks, G. R., Wentland, C., Keamy, D., et al. (2017). Hypoglossal nerve stimulation in adolescents with Down syndrome and obstructive sleep apnea. JAMA Otolaryngol Head Neck Surg.

Published by MM Publishers
https://www.mmpubl.com/ijpedorehab