ejpmr, 2023,10(4), 391-396

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

PARENTAL RESPONSES ABOUT SLEEP-DISORDERED BREATHING IN CHILDREN AND THE ROLE OF PEDODONTIST: A QUESTIONNAIRE-BASED STUDY

Dr. Mohamad Arshid Khanday*[1] and Dr. Nazia Lone[2]

Ex- Registrar Dept. of Pedodontics, Govt. Dental College, Srinagar, Jammu and Kashmir, India.
Professor and Head Department of Pedodontics Govt. Dental College and Hospital Srinagar.

***Corresponding Author: Dr. Mohamad Arshid Khanday**

Ex- Registrar Dept. of Pedodontics, Govt. Dental College, Srinagar, Jammu and Kashmir, India.

Article Received on 08/02/2023 **Article Revised on 01/03/2023** **Article Accepted on 22/03/2023**

ABSTRACT

Introduction: Obstructive sleep apnea (OSA) is a potentially disabling disease caused by complete or partial obstruction of the upper airway which is characterized by excessive daytime sleepiness, disruptive snoring and repetitive episodes of shallow or paused breathing during sleep. It is quite prevalent in adults; however its increased incidence in children is alarming. **Aim:** The objectives of this study were to evaluate the parental responses about sleep-disordered breathing (SDB) and its association with mouth breathing (MB) in their children and also highlight the role of pedodontist in early detection of OSA. **Methodology:** A structured questionnaire consisting of 10 questions was framed. 300 parents who responded to the questionnaire-based study were included after obtaining their consent. After obtaining their responses, all the questions were evaluated to understand the parental responses to associate their knowledge about sleep disordered breathing of their children with the presence of mouth breathing. **Conclusion:** Often thought to be due to altered lifestyle (obesity), its prevalence is quite often noticed in 2 to 8 years age group where the tonsils and adenoids are larger than the underlying airway size. Early detection and treating with simple oral appliances can avoid further complications.

KEYWORDS: Adenoid facies, *Obstructive Sleep Apnea*, mouth breathing,

INTRODUCTION

Sleep apnea is defined as an intermittent cessation ofairflow at the nose and mouth during sleep. By convention, apnea of at least 10 s duration have been consideredimportant, but in most patients, they are 15–20 s in lengthand may last as long as 1–3 min. Generally, sleep apnea is initiated when a decrease in blood oxygenation level (SpO2) at a minimum of 4% causes an individual to wake up to take a deep breath, and then return to sleep again.[1] The symptoms of SA are loud snoring, excessive daytime sleepiness, nocturnal choking or gasping, insomnia, and failure to concentrate, which might cause accidents. There are three types of SA: obstructive sleep apnea (OSA), which is the most popular form of the disease, central sleep apnea (CSA), and mixed sleep apnea (MSA). The first type is caused by the relaxation of the tongue or upper airway muscles during sleeping that blocks the airway, making breathing impossible.[2-3] The second type happens when the brain fails to send neural signals to the muscles necessary for breathing. The third type is comprised of symptoms from the first and second combined. This illness, accompanied by asphyxia and arousal, leads to high blood pressure, increasing heart rate (HR), compromised immune system, cardiovascular disease, type 2 diabetes mellitus, stroke, and memoryimpairment, as well as depression, growth and worsening of the condition if left untreated.[4] Initially, the same diagnostic parameters used to diagnose OSA in adults was applied to children. Concurrent with the improved recognition ofOSA has come the realization that because of the robust neurological development throughout childhood, young children are particularly sus-ceptible to the effect of SDB, and that symptoms and poly-somnographic characteristics of OSA in childhood are sub-stantially different when compared with those of adults.[5] This has led to refinements in how pediatric SDB and OSA are evaluated.

In recent years, sleep-disordered breathing (SDB) and pediatric obstructive sleep apnea (POSA) have received more public attention and are now at the forefront of significant medical concern and areas of research.[6] Given the high prevalence of comorbidities including neurocognitive dysfunction, cardiovascular complications, and obesity, SDB in children is a timely public health concern.It is valuable to recognize paediatric patients at risk of "SDB" to prevent other health-related sequel, such as "cardiovascular disease," "delayed somatic growth," "metabolic disorders," psychological health hampered, and decreased life

quality. The inaccurate history of child patients received by few parentsand their difficulties in getting young children for dentaltreatment are some of the problems that influence in clinicaldecision-making process.[7] Therefore, present study was conducted with the aim to evaluate the parental responses about SDB and also highlight the role of pedodontist in early detection of OSA.

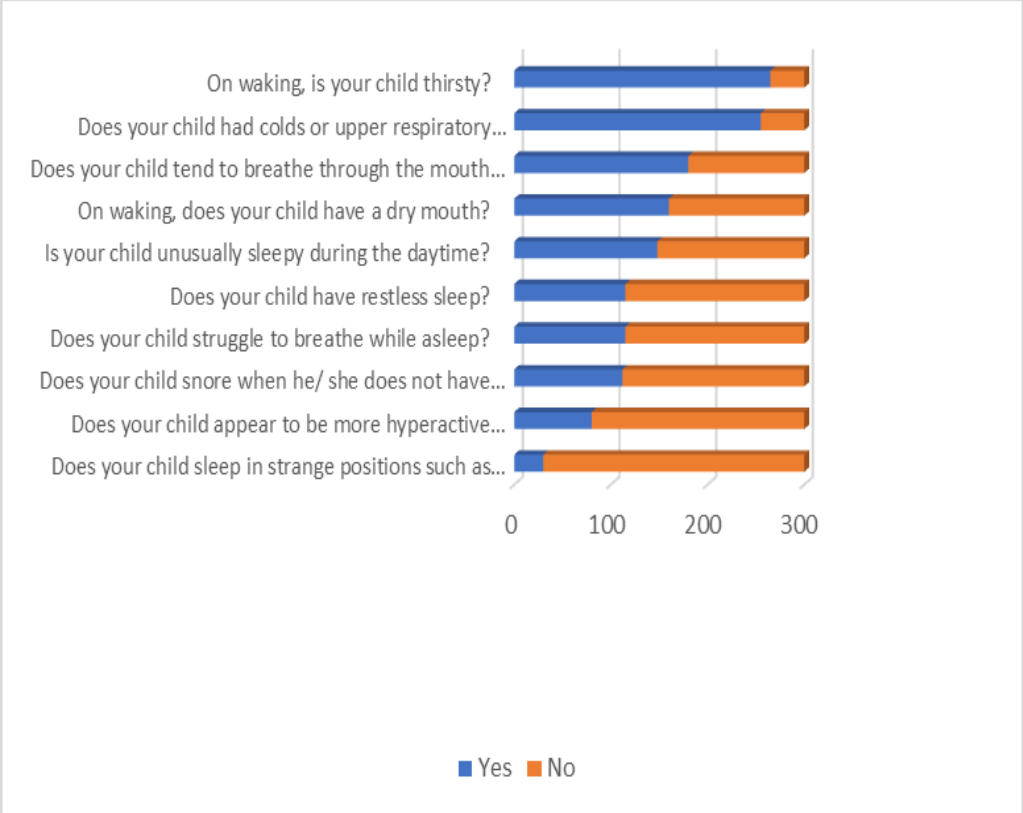
METHODOLOGY

The present questionnaire based study was conducted in the Department of Pedodontic and Preventive dentistry GDC Srinagar. All the mothers who accompanied their children to the department for receiving dental treatment were included in the study. The present study included children with a sample size of 300. Initially, a questionnaire was distributed to 300 parents. Beforestarting the study, ethical committee clearancewas obtained from the Institutional Ethics Committee .Before enrolling children for the study, parental consent wastaken.Responses to be entered were in the form of symptomsof child either "Yes" or "No" category. After obtaining theresponses, they were associated with symptoms of childrenshowing MB during sleep.Statistical analysis was carried out by using the Microsoft Office Excel and analyzed in SPSS Statistics version 17.0.Chi-square test was appliedto evaluate the "responses." "$P < 0.05$" was considered to be"statistically significant."

RESULTS

Graph 1 Table 1 show the list of questions in questionnaireand their responses.

40.6% of children had habit ofsnoring while 62.6% of children had no snoring habit in theabsence of cold. When asked about Does your child struggle to breathe while asleep? 38.3% answered yes while 61.7% never used to breathewhile asleep. 60% mothers told their children used to breathe througf mouth during the day time. And 53.3% complained of dry mouth of their children on waking up from the sleep. When asked about On waking, is your child thirsty? 88.3% answered yes. For the question "Does your child had colds or upper respiratory infections thataffect their breathing at night? 85% answered positively. However for the question Does your child sleep in strange positions such as rocking the head backwards or sleeping while sitting upright on pillows or kneeling? Only 10% answered positively. While asking about the sleep disorders 38.3 % had restless sleep and 49.3 % were unusually sleepy during the day time. When asked about Does your child appear to be more hyperactive than children of a similar age? Only 26.7 answered positively. There was a stastically significant difference ($p<0.001$) except, Is your child unusually sleepy during the daytime?($p=0.65$) not significant.



Graph 1: Parental Responses about Sleep Disordered Breathing and its Association with Mouth Breathing in their Children.

Table 1: Parental Responses about Sleep Disordered Breathing and its Association with Mouth Breathing in their Children.

1.	Does your child snore when he/ she does not have common cold	Yes	112 (40.6%)
		No	188 (62.6%)
2.	Does your child struggle to breathe while asleep?	Yes	115 (38.3%)
		No	185(61.7%)
3.	Does your child tend to breathe through the mouth during the day?	Yes	180(60%)
		No	120(40%)
4.	On waking, does your child have a dry mouth?	Yes	160 (53.3%)
		No	140 (46.7%)
5.	On waking, is your child thirsty?	Yes	265 (88.3%)
		No	35 (11.7%)
6.	Does your child had colds or upper respiratory infections that affect their breathing at night?	Yes	255 (85%)
		No	45 (15%)
7.	Does your child sleep in strange positions such as rocking the head backwards or sleeping while sitting upright on pillows or kneeling?	Yes	30 (10%)
		No	270 (90%)
8.	Does your child have restless sleep?	Yes	115 (38.3%)
		No	185 (61.7%)
9.	Is your child unusually sleepy during the daytime?	Yes	148 (49.3%)
		No	152 (50.7%)
10.	Does your child appear to be more hyperactive than children of a similar age?	Yes	80 (26.7%)
		No	220 73.3%)

DISCUSSION

Sleep apneas was firstly described in 1975 in related to rapid infant death syndrome and since then in children are observed that the sleep disorder has been significantly increasing. The most common cause of pediatric OSA is adenotonsillar hypertrophy.[8] Other risk factors that can also be considered may include asthma, exposed to tobacco smoke and low socioeconomic status, whereas macroglossia, mandibular or midface hypoplasia, obesity and other craniofacial anomalies, these are the additional craniofacial risk factors in children OSAS is defined as a disorder of breathing during sleep characterized by *prolonged* partial upper airway obstruction and/or *intermittent* complete obstruction (obstructive apnea) that disrupts normal ventilation during sleep and normal sleep patterns An apnoea hypopnoea index value greater than 1 is considered abnormal in a child.[9]

The etiology of OSA is multifactorial. There are certain features that predispose children to sleep apnea. a significant factor in children is Adenotonsillar hypertrophy, and its largest in the first few years of life and then involutes by adolescence and into adulthood. Among the craniofacial characteristics predisposing to OSA, nasomaxillary midface deficiency can occur in various craniofacial deformities as in Apert syndrome, Crouzon syndrome, Pfeiffer syndrome and repaired cleft palate whereas in Pierre Robin sequence, severe juvenile rheumatoid arthritis, Treacher Collins syndrome, Nager syndrome, Stickler syndrome presented with Marked mandibular hypoplasia among the predisposing factors. Combination of the factors may be seen in Down syndrome, Achondroplasia, Prader-Willi syndrome and Mucopolysaccharidoses.[10]

Sleep stages are the intervals of non- Rapid Eye Movement (REM) and REM sleep. Non-REM sleep is divided into stages 1 to 4 with stage 1 being the lightest level and stage 4 very deep sleep. After progression through all 4 stages in about 90 minutes, stage REM begins. It is during this stage that dreams most often occur and more importantly the muscle tone decreases. The cycle repeats during the night with the length of stage REM increasing until this stage predominates by early morning.[11]

Active sleep reduces the intercostal muscle tone resulting in a reduction in lung volume compared to wakefulness which further leads to a reduced functional residual capacity and decrease in oxygen reserves. These events ultimately increase the likelihood of hypoxia.[12]

A deeper understanding into the process reveals that there are two important groups of muscles that are responsible for inspiration while we are asleep. The *diaphragm and the intercostal muscles* are responsible for creating a negative airway pressure which is necessary for the process of inspiration to begin. Conversely the upper airway patency is maintained by the *oropharyngeal muscles*.[13] Nevertheless, when the negative pressure exceeds the force produced by these muscles, the pharynx will collapse thus, occluding the airway. The negative pressure creates a vacuum that sucks not just the air but also the flaccid tongue. The resultant narrowed airway accelerates the airflow which causes audible vibrations of the soft palate and uvula leading to what is commonly called "Snoring". The falling back of the tongue along with the collapse of the pharynx seals the airway such that the oral and nasal air can no longer reach the lungs. The diaphragm intensifies its efforts to suck in the air but instead makes the seal

tighter. With the resultant cessation of breathing, the blood carbon dioxide levels raise high enough to awaken the patient. This usually occurs with a loud snort and then within seconds, the patient is asleep.[14]

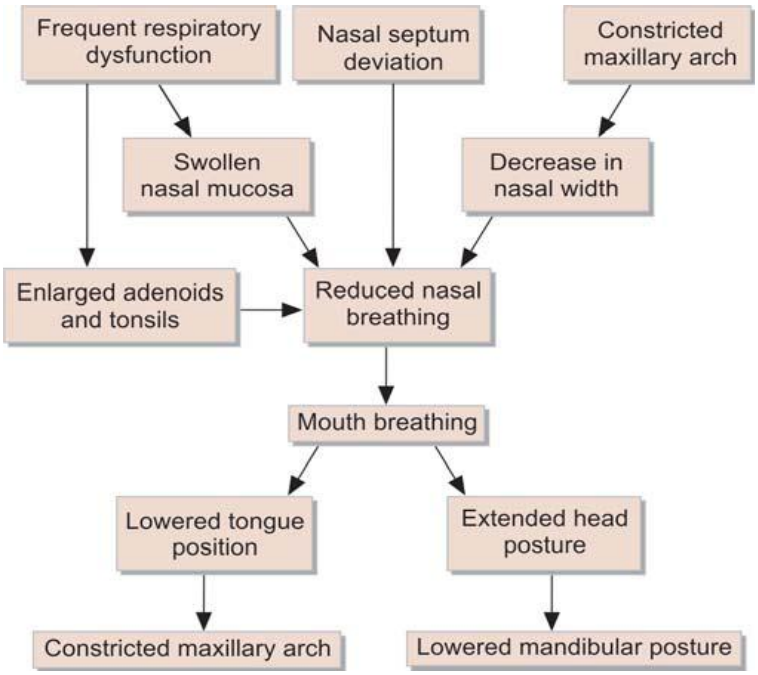
Pediatric patients with well-controlled OSA present fewdifficulties for routine dental treatment. However, patients withuntreated or undiagnosed OSA can present the dentalpractitioner with multiple issues and challenges. Dentalprofessionals have a unique doctor-patient relationship thataffords them a role in recognizing sleep disorders by exploringthe history of patients who are sleepy.[15]

Diagnostic criteria of OSAS in children

Frequent signs Infrequent signs

- Nocturnal snoring Daytime sleepiness
- Mouth breathing Decreased appetite
- Restless sleep with or Failure to thrive
- Without arousals Frequent vomiting
- Respiratory pausesSwallowing dysfunction
- Respiratory infections Behavioral problems
- Chronic rhinorrhea Otitis media
- Nocturnal sweating Enuresis

It is also clear that the well-described but extremely complexinteraction between nasal breathing and facial growth isimportant, even if it is rarely investigated. The most common orofacial characteristics encounteredinclude a retrognathic mandible, narrow palate, large neckcircumference, long soft palate (which leads to dentists'being unable to visualize the entire length of the uvula whenthe patient's mouth is open wide), tonsillar hypertrophy,nasal septal deviation and relative macroglossia.[16]



In providing collaborative patient-centered care, it is advisable for dentists to follow the established guidelines for the care of children with SDB, which have been prom-ulgated by the American Academy of Pediatrics (AAP), American Academy of Pediatric Dentistry (AAPD), Amer-ican Dental Association (ADA), and jointly by the Ameri-can Academy of Sleep Medicine (AASM) and the Ameri-can Academy of Dental Sleep Medicine (AADSM).The AAP guidelines pertaining to dentists who treat children advise that "all children/adolescents should be screened for snoring" and referred to a qualified medical professional. Polysomnography should be performed in children/adolescents with snoring symptoms/signs of (POSA)," "weight loss is recommended in addition to other therapy in patients who are overweight or obese," and "in-tranasal corticosteroids are an option for children with mild (POSA) in whom AT is contraindicated or for mild postop-erative (POSA).[17]

The AAPD guidelines serve as the preeminent stand-ards for dentists treating children. It is notable that the guidelines focus on the screening, clinical assess-ment, and then referral to medical specialists for workup and diagnosis. With further dental involvement in the pa-tient's care, and based on the recommendation of the pa-tient's physician, other treatment modalities may then be discussed. Thus, it is essential that dentists adhere to the AAPD guidelines when treating children and dentists who treat children conduct a thorough history and clinical screening for sleep-related breathing disorders.[18]

As recom-mended by the AAPD guidelines, the parents of pediatric patients should be asked if their children

exhibit any symp-toms of POSA. All dentists who treat children using oral conscious sedation (OCS) should be well versed in the risks involved if a patient has moderate-severe hypertrophy of the tonsils. One such risk is the increased likelihood for a patient to experience an upper airway obstruction during OCS.[19]

Symptoms of Obstructive Sleep Apnea (Adapted from Pediatric Dentistry)

1	Excessive daytime sleepiness
2	Loud snoring three or more nights per week
3	Episodes of breathing cessation witnessed by another person
4	Abrupt awakenings accompanied by shortness of breath
5	Awakening with dry mouth or sore throat
6	Morning headache
7	Difficulty staying asleep
8	Attention problems
9	Mouth breathing
10	Sweating
11	Restlessness
12	Waking up a lot

Dentists and orthodontists may contribute to the screening andmanagement process of pediatric OSA. Some specific craniofacialfeatures have been linked to the disease.[20] Some orthodontic management options might benefit a distinctsubgroup of OSA children but should not be solely indicated to decreaseOSA signs and symptoms as concurrent craniofacial indicationsshould exist.[21] Oral health professionals should be part of a transdisciplinaryteam in the management of pediatric OSA. It is expected that specific pediatric OSA subgroups that benefitfrom distinctive craniofacial approaches will be identified in the future.Current variability in response to these management approachesmay be a function of inadequate case selection.

CONCLUSION

Pediatric obstructive sleep apnea is highly prevalent in children and is associated with numerous health-related complications. Of equal concern is the likelihood that POSA will remain undiagnosed or diagnosis will be de-layed in many children. Pedodontists have been identified as having an important role to play both in the early identification of Obstructive Sleep Apnea as well in its management. Thus, a greater understanding and awareness among dentists on OSA, particularly in children cannot be over emphasized.

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