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Malocclusion and its Association with Pediatric Obstructive Sleep Apnoea in Saudi Arabia

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ABSTRACT

Background: Sleep-disordered breathing (SDB) is seen as an irregular respiratory pattern during sleep and has a spectrum of disorders that enhance in intensity from snoring to obstructive anti snoring (OSA). OSA is the most important presentation of Sleep-disordered breathing and will be now identified as a significant condition that has an effect on an estimated 1.2% to 5.7% of young children. Objectives: The aims of this study were to assess the prevalence of malocclusions in 3-to12-year-old children suffering from obstructive sleep apnoea (OSA) and to evaluate the association between occlusal variables and OSA.

Materials and Methods: The current study was a cross-sectional observational analytic study. Our study includes 150 children having the age group of 3 to 12 years who visit the Department of Pediatric Dentistry in the College of Dentistry, King Khalid University. One hundred and fifty children (range 3-12 years) were included whose parents reported snoring on a regular basis and signs or symptoms of OSA. A self-administered questionnaire was prepared in both Arabic and English languages and distributed to all the participants. All the data were collected and analyzed by using SPSS version 21.

Results: The prevalence of malocclusion in OSA children was 26%. The distribution of other malocclusions trait recorded. Molar relation was seen in Class 1 (27.3%), Class II (9.3%) and Class III (7.3%). Other traits were observed as Over jet (8.7%), Overbite (4.7%), Anterior Open bite (6.7%), Posterior Cross bite (3.3%), Anterior Cross bite (6%) and Crowding (26%).

Conclusion: Posterior cross bite and deviations in over jet and overbite seem to be significantly associated with OSA. The presence of these occlusal features shows the importance of an orthodontic evaluation in screening for paediatric OSA.

Key words: Obstructive sleep apnoea, Malocclusion, Children, Saudi Arabia

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INTRODUCTION

Sleep-disordered breathing (SDB) is seen as an irregular respiratory pattern during sleep and has a spectrum of disorders that enhance in intensity from snoring to obstructive anti snoring (OSA). OSA is the most important presentation of Sleep-disordered breathing and will be now identified as a significant condition that has an effect on an estimated 1.2% to 5.7% of young children [1,2]. Morbidity connected with OSA in children involves failing to thrive, attention deficit and hyperactivity disorder, extreme daytime sleepiness, and inadequate learning. Additionally, there is substantial concern about long-term cardiopulmonary risks in these patients [3]. The impaired

function and collapse of the upper airway during sleep is really a dynamic and sophisticated process. As such, OSA in children can derive from a mix of factors which includes inflammation and modified neuromuscular tone of the upper airway, being overweight and hypertrophic adenoids and tonsils. Because the pathophysiology of SDB in children has become better described and recognized, changed craniofacial morphology has been shown as an adding risk component for the condition in some kids [4]. The most generally documented dentofacial characteristics in kids with OSA are linked with a long narrow face, including mandibular retrognathia, maxillary constriction, increased lower face height, and a convex profile [5]. The treatment of two specific dentofacial anomalies, maxillary constriction and mandibular retrognathia, has already been demonstrated to significantly enhance or remove both objective and subjective steps of OSA in children [6]. Obstructive Sleep Apnoea (OSA) is a breathing problem recognized by repetitive episodes of extended upper airway obstruction and intermittent complete obstruction that disrupts regular sleep patterns. The symptoms include neurobehavioral issues, disturbed sleep and snoring. The occurrence of OSA in children is 1%-4% and, if left untreated, it could result in serious complications, which consist definitely of neurocognitive impairment, corpulmonale, failure to thrive and behavioural problems. The etiology is multifactorial, and the primary risk factors in children consist of adenotonsillar hypertrophy, craniofacial anomalies, neuromuscular disorders and obesity. However, a recently available review focused on emerging oral treatment plans for children with OSA. In adulthood, the usage of oral appliances is really a therapeutic alternative in the management of OSA. Although various Cephalometric studies have defined the most frequent craniofacial anomalies connected with OSA in children, data concerning the prevalence of malocclusion in paediatric OSA patients are rare. Furthermore, earlier investigations were tied to non-objective sample selection and small sample size. The aims of this study were to assess the prevalence of malocclusions in 3-to12-year-old children suffering from obstructive sleep apnoea (OSA) and to evaluate the association between occlusal variables and OSA.

MATERIALS AND METHODS

The current study was a cross-sectional observational analytic study. Our study includes 150 children having the age group of 3 to 12 years who visit the Department of Pediatric Dentistry in the College of Dentistry, King Khalid University. One hundred and fifty children (range 3-12 years) were included whose parents reported snoring on a regular basis and signs or symptoms of OSA. Ethical letter for carrying out the study was acquired from the Institutional review board (IRB/KKUCOD/ETH/ 2021-22/06) of the College of Dentistry, King Khalid University.

Exclusion criteria were genetic syndromes, recent acute infections of the upper airways or acute otitis media, previous history of orthodontic treatment or adenoidectomy and/or tonsillectomy, dental anomalies or missing teeth, history of neuromuscular disease, craniofacial syndromes, cerebral palsy, sickle cell disease, mucopolysaccharides storage disease, or immunodeficiency. Voluntary informed consent was obtained from the parents before the examination of the child. Clinical examination was carried out by examiners for the assessment of occlusal variables involving the following parameters i.e., crowding, spacing, open bite, cross bite and deep bite. Children with oral and dental treatment needs were referred to the College of Dentistry KKU, for further counselling and treatment.

All the standard preventive and safety measures were taken during the examination of the childlike checking temperature, sterilization, and use of proper mouth mask, Gloves, PPE kit, and others, so as to prevent the spread of coronavirus in this pandemic period. The investigator was trained in the Department of Pedodontics Dentistry, College of Dentistry on ten subjects. Calibration was done on ten subjects who were examined twice using diagnostic criteria for malocclusion between the two examinations, and then the results were compared to diagnostic variability. Data analysis was used to describe the main variables by SPSS 18 (IBM Corporation, Armonk, New York, USA) software. The Chisquare test was used to determine the relationship between categorical variables. The level of significance was set at $P < 0.05$.

RESULTS

Our study includes 150 children having age group of 3 to 12 years, who visit the Department of Pediatric Dentistry in the College of Dentistry, King Khalid University.

One hundred and fifty children (range 3-12 years) was included whose parents reported snoring on a regular basis and signs or symptoms of OSA. The numbers and percentages of children with dental malocclusions and Obstructive Sleep Apnoea shown in Table 1.

The prevalence of malocclusion in OSA children was 26%. The distribution of other malocclusions trait recorded. Molar relation was seen in Class 1 (27.3%), Class II (9.3%) and Class III (7.3%).

Other traits were observed as Over jet (8.7%), Overbite (4.7%), Anterior Open bite (6.7%), Posterior Cross bite (3.3%), Anterior Cross bite (6%) and Crowding (26%). Due to time restrain and to avoid interobserver bias in the huge study population, the degree of malocclusion was not recorded.

Students needing immediate dental treatment were referred to KKU/COD Dental Clinics.

Table 1: The numbers and percentages of children with dental malocclusions and obstructive sleep apnoea.

Variables	No. (Total=150)	%
Occurrence of malocclusion		
Yes	39	26
No	28	18.7
Molar Relationship		
Class I	41	27.3
Class II	14	9.3
Class III	11	7.3
OVERJET		
Present	13	8.7
Absent	54	36
Overbite		
Present	7	4.7
Absent	59	39.3
Anterior Open Bite		
Present	10	6.7
Absent	57	38
Posterior Cross bite		
Present	5	3.3
Absent	63	42
Anterior Cross bite		
Present	9	6
Absent	58	38.7
Sleep-disordered breathing		
Present	18	12
Absent	9	6

DISCUSSION

Our outcomes illustrate a significantly increased prevalence and the relationship between malocclusion and OSA. This finding is consistent with earlier research showing a relationship between snoring and malocclusion [7,8]. As earlier documented, the existence of a posterior cross bite is associated with the altered equilibrium involving the tongue and cheeks [9].

The reduced and anterior position of the tongue associated to mouth breathing outcomes in a lack of internal pressure, leading to a decrease of transversal growth of the upper arch with the growth of lateral and posterior cross bite [9]. However, mouth breathing is related to reduced nose prominence and width dimensions compared to normal children [10].

These facial features may lead to a decreased upper airway space resulting in obstructive apnoea events. We verify the association between OSA and reduced overbite, as earlier documented. Additionally, we record that an increased over jet is considerably related to OSA.

That is in agreement with a report by Cazzolla et al. [8], who identified a statistically significant association between snoring and increased over jet. We guess that decreased overbite and increased over jet are linked to the vertically oriented craniofacial growth pattern that is clearly a typical sign of OSA in kids [11].

The difficulties of clearly discovering children with OSA based on clinical examination alone have also been documented in medical literary works [12]. Recently, data from the large multicentre trial also showed that evaluation of clinical parameters such as tonsillar size and palate position by physical examination gives very limited info on OSA severity in prepubertal young children [13]. Therefore, it could be advisable for clinicians to screen for symptoms of the condition in all patients and not simply those who are current with the classic associated features of adenoid facies. Should positive reactions to a health background form, interview, or questionnaire [14] result in suspicion of an obstructive sleep disorder, the individual may then be referred a suitable pediatric sleep specialist for diagnosis and management.

Based on this record, it could be recommended a clinical orthodontic examination may be beneficial as an adjunct to health background in the screening for OSA in children. When suspect orthodontic features are determined, the kid should be referenced regarding further examination of OSA. Furthermore, it has been shown that orthodontic treatment plans, like rapid maxillary expansion (RME) and mandibular advancement, may decrease OSA symptoms in children, despite the fact that long-term follow-up [15]. Research of OSA in young children after orthodontic therapy is limited [16]. It has also been documented those craniofacial abnormalities are risk factors for the development of OSA within adults [17]. In this respect, it could be hypothesized that executing orthodontic evaluations and therapy in children might decrease the effect of OSA in grown-ups. This study has certain limitations. Orthodontic variables were not taken from dental casts but by means of immediate inspection by an orthodontist (dental impressions were avoided due to the young age of the kids examined). It is clear that will be population represents an extensive range of SDB symptoms. However, we consider this population to be reflective of a typical clinical setting for a regional sleep centre, and should orthodontic therapy be applied to pediatric patients with OSA it might be best reviewed with the other planned interventions. Patient ethnicity isn't regularly documented at our institution and is lacking from the existing data.

CONCLUSION

A significant prevalence of skeletal malocclusion was not found in this pediatric population with sleep-disordered breathing. Posterior cross bite and deviations in over jet and overbite seem to be significantly associated with OSA. The presence of these occlusal features shows the importance of an orthodontic evaluation in screening for paediatric OSA.

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Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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