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Review

An Overview of Mouth Breathing Syndrome and its Effect on Dental Development

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Abstract

Mouth breathing syndrome is a major harmful oral condition in children that causes them to switch from exclusively nasal breathing to mouth breathing or mixed breathing. It frequently happens as a result of an obstruction of the upper airway, which forces all or part of the air to enter through the mouth. Serious morphological and quality-of-life alterations are brought on by it. There are a number of causes for mouth breathing, but allergic rhinitis may be the most widespread, affecting more children. The second reason for this breathing pattern is palatine tonsils and adenoids. This multifactorial condition jeopardizes the balance of stomatognathic functions such as chewing, swallowing, breathing, and phonation, as well as creating conditions that influence the individual's development. Uncontrolled mouth breathing can have an adverse impact on the dentofacial system's health as well as aberrant dental and maxillofacial development. Based on the cause of mouth breathing, mouth breathers may demonstrate various dental development patterns, malocclusions, and maxillofacial development consequences. Furthermore, breathing through the mouth might harm dental health and raise the risk of periodontal and caries disorders. Because mouth breathers have several problems, a thorough and interdisciplinary clinical assessment is required to identify this syndrome early and reduce its negative effects on dentofacial development. This review finds that a multidisciplinary approach to these issues needs to make significant progress.

Keywords: mouth breathing syndrome, mouth breathing, dental, dentofacial

Introduction

Mouth breathing syndrome is characterized by a switch from exclusively nasal breathing to mouth breathing or mixed breathing. The involvement of this syndrome includes postural, functional, occlusion, biomechanical, and behavioral aspects (1). Even if it is still debatable, >50% of children have been found to be mouth breathers so far (2).

There has been much discussion in the orthodontic literature on how breathing patterns, whether nasal or oral, affect the growth and development of the craniofacial structure. Mouth breathing in children is a sign of underdeveloped oral function and has an adverse effect on the dentofacial morphology and oral environment (3, 4). For the balanced development of craniofacial features, normal nasal breathing is crucial (5). Nasal obstruction leading to mouth breathing is known as obstructive mouth breathing, which can be caused by enlargement of the nasal turbinates and pharyngeal lymphoid tissue (tonsils and adenoids). Unlike habitual mouth breathing, which has no underlying cause other than mouth breathing itself. Anatomical anomalies in the oral and nasal anatomy can also result in mouth breathing, which is referred to as anatomical mouth breathing. Ineffective lip seals resembled mouth breathers physically and were linked to disorders of the nose and throat, dental conditions including caries and gingivitis, and oral activities like eating and drinking (6). Nasal breathing causes an asymmetrical development of the maxillary bones as well as the dysfunction of the entire intra- and perioral musculature. Numerous studies have been conducted on the dentofacial anatomy and characteristics of mouth breathers. While most of the studies discovered significant alterations in the facial morphology of mouth breathers, other investigations found no proof of an association between particular malocclusions or changes in the facial skeleton (7-9).

Detection and treatment of mouth breathing at an early stage are advantageous for maintaining normal dentofacial function and structure, as well as preventing related health problems. The present investigation aimed to elucidate mouth breathing syndrome and its impact on dental development.

Methods

For the preparation of this paper, we used scientific articles published in scientific indexed journals identified from the databases PubMed, Google Scholar, the Cochrane Library, and MEDLINE using the keywords "mouth breathing" and "mouth breathing syndrome." Inclusion criteria for the study were papers that addressed causative factors, prevalence, and dentofacial aspects of mouth breathing, published in the last ten years of the scientific article type, based on case-control, cohort, clinical trials, or systematic reviews, and conducted with samples of all ages and both sexes.

Discussion

Prevalence, Etiology, and clinical manifestations

The prevalence of mouth breathing syndrome among children ranges between 6.6% and 56.8% (2, 10). The diagnosis of mouth breathing syndrome is made by clinical investigation and diagnostic procedures, and the pediatrician, who generally has the initial contact with children who breathe through their mouths, should collect a complete patient history and give due weight to information on clinical manifestations to ensure early identification and appropriate care (11).

The etiology of mouth breathing may be multifactorial and attributable to anatomic factors. The foremost prevalent reason for mouth breathing is the presence of nasopharyngeal obstructions, which increase nasal resistance. Nasal obstruction may be the result of congenital or postnatal causes and may increase airflow resistance and impair sucking-swallowing responses, hence increasing the risk of aspiration or more severe and life-threatening respiratory distress situations. The most prevalent cause of mouth breathing is allergic rhinitis, followed by nasal morphological deformities that decrease nasal ventilation and airflow, hypertrophic adenoids, hypertrophic tonsils, and an obstructive deviated nasal septum (11). Mouth breathing syndrome can also be caused by nasal or facial abnormalities, nasal trauma, or nasal polyps. Some researchers assert that hyperplasia of the adenoids and tonsils is a leading cause of upper airway blockages in children. Multiple studies conducted in recent years have established that allergic rhinitis is one of the leading causes of chronic mouth breathing in children who are still growing. In addition to affecting the proper development of the facial skeleton, allergic rhinitis has a major negative impact on overall health, asthma control, and quality of life. It is an inflammatory process of the nasal mucosa that results in unilateral or bilateral nasal obstruction due to the expansion of the inferior, middle, or superior nasal conchae. Furthermore, the emergence of mouth breathing by Pacheco AB *et al.* and Theodoro E *et al.* (12, 13) that the emergence of mouth breathing coincides

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with a drop in labial closure and nursing, as well as an increase in bottle and pacifier sucking. Additionally, mouth breathing can be caused by respiratory allergies, climate, and a bad sleeping position (7).

The most common clinical signs of mouth breathers determined by Abreu RR *et al.* were sleeping with the mouth open (86%), snoring (79%), an itchy nose (77%), drooling on the pillow (62%), nocturnal sleep disturbances or disturbed sleep (62%), nasal blockage (49%), and daytime irritability (43%) (11). The majority of guardians and parents will not voluntarily provide information on disorders such as these symptoms since they view them as insignificant or typical.

A timely diagnosis is essential for the treatment of mouth breathing and the prevention of related diseases. To correctly diagnose a habit of mouth breathing, a thorough case history, clinical examination, and diagnostic testing may be required. It is essential to diagnose a patient with a tendency to mouth breathe using all available clinical testing. The mirror test and the water retention test are two of the most commonly mentioned breathing tests in literature. The most often used test is the lip-seal test, followed by the mirror test and the water retention test (14). Depending on the cause and consequences for each patient, mouth breathing may be treated with medication, surgery, rehabilitation speech therapy, physical therapy, or orthodontics.

Dental development features and health problems of mouth breathing patients

The stomatognathic system can undergo structural and functional changes as a result of mouth breathing. Prior data indicates that nasal obstruction scores may serve as an indicator of such changes (15). Also, there is evidence that mouth breathing is connected with dental and cranial variables and that it worsens during adolescence (16). Patients diagnosed with mouth breathing syndrome typically exhibit an anterior open bite, atresia, posterior cross bite, and severe overjet. These malocclusions, a manifestation associated with the development of dentition, are mostly the result of an imbalance between the tongue, lips, and perioral muscles (17, 18). Children who breathe through their mouths have a higher incidence of a posterior cross bite than the overall population. During mixed and permanent dentitions, mouth breathers were far more probable to have an anterior open bite and a class II malocclusion (19). In a systematic review, it has been confirmed that the prevalence of malocclusion of Angle Class II, division 1, tends to be higher than Class I malocclusion in mouth-breathing children (20). Burska *et al.* (21) showed in a recent case-control study that bigger palatine tonsils, higher scores on the Mallampati classification, and the presence of a cross bite, a short lingual frenulum, and a high-arched palate may indicate disordered breathing during sleep in children. In another cross-sectional observational study that investigated typologies of facial and dental asymmetries in a sample of children aged between 3 and 6 years, Vitale *et al.* (22) found a close correlation between the presence of dental malocclusions and the presence of oral breathing. Children with healthy breathing habits shut their mouths with their lips. The tongue contacts the palate and the lingual surface of the maxillary teeth. The development of a healthy upper dental arch requires a balance of muscular strength between the inner tongue, cheeks, and outer lips. According to the results of the aforementioned investigations, mouth breathing in children may be a risk element for the emergence of malocclusion.

If not treated on time, mouth breathing throughout childhood may negatively influence dentofacial development. As a result of decreased airflow in the nasal cavity, mouth breathing interfered with the anteroposterior position of the maxilla. This results in nasal and paranasal hypoplasia as well as a reduction in tongue pressure against the palate, which can lead to a deviation in vertical growth as the mandible remains downward and backward relative to the cranial base.

Mouth breathing inhibits dentoskeletal development and masticatory function, diminishes the magnitude and duration of vertical occlusal stress on developing children's posterior teeth, and decreases chewing activity, according to research (23). In children, adenotonsillar hypertrophy is a significant reason for mouth breathing. The adenoids and palatine tonsils are positioned at distinct locations in the upper airway. During the growth stage, varied sites and periods of obstruction may result in comparable face patterns. As a result, children with adenoid and tonsillar hypertrophy have dentofacial development that is extremely sophisticated (24). Mouth breathing impacts maxillofacial development in children as well. Frequently, mouth breathing is associated with a skeletal Class II orthodontic classification, characterized by mandibular retrusion and maxillary protrusion (41, 42). According to an analysis of cephalometric data, mouth breathers are more likely to have a retrognathic mandible and maxilla, downward and backward rotation of the mandible, a vertical growth pattern with a high mandibular plane angle, a decrease in posterior facial

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height, and an increase in total and lower anterior facial height (25). Also, a high palatal vault is one of the most typical indicators of mouth breathing. The height of the palatal vault in the region of the molars was 11% greater in mouth-breathing children compared to nose-breathing children (26).

Choi *et al.* imply that mouth breathing during sleep is associated with a reduction in intraoral pH relative to normal breathing during sleep; this has been hypothesized as a cause of tooth erosion and caries (27). Mouth breathing can culminate in modifications to the saliva-mediated defense system and a diminished self-cleansing ability of the saliva, hence accelerating plaque buildup. Additionally, the reduction of epithelial cells that can defend against plaque and the dryness of the gingival area caused by airflow might lead to the development of severe oral diseases such as periodontal disease and gingivitis (28, 29). Nonetheless, their relationship has remained adversarial (30). Bakshaee *et al.* found, however, that allergy rhinosis and oral breathing may have an effect on oral health and dental conditions, leading to an increase in tooth loss, oral fillings, and the development of dental caries (31). Chronic mouth breathing resulting from nasal adenoids and adenotonsillar hypotrophy has been shown to exacerbate gingival and periodontal disorders (28). The dental literature demonstrates the connection between nasal respiration, tongue protrusion, and an anterior open bite. Arch form and tooth placement are principally determined by the equilibrium of tongue and perioral muscle forces. The increased force from the tongue's musculature makes the anterior teeth more susceptible to periodontal and traumatic tooth loss in tongue-throwers (32). The condition of the temporomandibular joint and periodontal tissues may be affected by several complicating variables, including the correlation between mouth breathing and dental health. In addition, there may be a relationship between anomalies in the dentofacial regions, which merits additional studies.

This review emphasized the scarcity of studies on mouth breathing, particularly in adults, as well as the majority of studies focusing on the effects of mouth breathing rather than its causes and treatments. As long as these patients receive a global and timely response, it demonstrates the importance of health professionals becoming educated about mouth breathers.

Conclusion

Due to the numerous causes of mouth breathing syndrome, a comprehensive and multidisciplinary treatment strategy is required to recognise it early and minimise its harmful effects on dentofacial development. This review suggests that a multidisciplinary approach to these individuals is required for all health practitioners to better comprehend the illness and prevent its complications. In addition, there is a need for high-quality evidence or clinical trial research explicating the impacts of mouth breathing on dental growth and health.

Disclosure

Conflict of interest

There is no conflict of interest

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Ethical consideration

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Data availability

Data that support the findings of this study are embedded within the manuscript.

Author contribution

All authors contributed to conceptualizing, data drafting, collection and final writing of the manuscript.

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