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REVIEW ARTICLE

MOUTH BREATHING "A HABIT OR ANOMALY" – A REVIEW

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ABSTRACT

Mouth breathing has been discussed for quite some time but there is a need to increase the awareness about its effects on the dentofacial structures. The review focuses on the systemic and local effects of Mouth Breathing that includes the effects on psychological development including classification based on systemic influences. Though the dentofacial effects are discussed commonly the article aims to summate the systemic effects such as ADHD and sleep apnea that have an effect on the overall development for children. Management strategies such as nasal patches shows the importance of a parallel ENT therapy to be incorporated for better success.

KEYWORDS : Airway Obstruction, Mouth Breathing, Hypoxia, Sleep Apnea Syndrome, Respiratory insufficiency.

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INTRODUCTION:

Human infants are sometimes considered to be obligate nasal breathers, may also breath through mouth or both. "Nasal breathing at rest is most common though the mouth is used as an additional passage during exercise or strain to increase oxygen intake. Mouth Breathing (MB) is breathing through the mouth rather than the nose. [1] William James (The Principles of Psychology, 1980) emphasized the importance and power of human habit and proceeded to draw a conclusion. It was noted that the laws of habit formation are unbiased; habits are capable of causing either good or bad actions. Once either a good or bad habit has begun to be established, it is very difficult to change. The repetitive nature reinforces the action in the memory and control passes from a conscious system into an automatic impulsive system. Habit as an automaticity and frequency is a more useful conceptualization because automaticity explains persistence of habits and discriminates it from frequently performed non habit actions [2].

MB is a more compensatory and not a learned and impulsive mechanism and it presentation as a syndrome [3] has been considered following its effect on certain mental skills. Hence this review has been discussed with the view of depicting MB more as a condition or anomaly rather than a habit which seems to imply that the patient is breathing though their mouth out of their preference i.e. a learned process rather than a compensatory mechanism.

REVIEW OF LITERATURE:

ETIOLOGY:

A study on the etiology of MB in 3-9 year old children showed that it was associated in 81.4% with allergic rhinitis, 79.2% with adenoid hypertrophy, 12.6% with tonsil hypertrophy and 1% with nasal septal deviation. The study group was selected as there is a peak incidence of adenoid hypertrophy in this age group. Most of the MB in this group exhibited open mouth as a clinical manifestation. [4] The ENT specialist's point of view suggests obstructive diseases such as tonsils, adenoid hypertrophy, nasal septal deviation or lower turbinate hypertrophy to cause a significant obstruction leading to MB. [5] Children with developmental disabilities showed that boys and those under psychotropic medication had a greater chance of being mouth breathers. [6]

EFFECTS OF MOUTH BREATHING ON OVERALL HEALTH:

Effect on psychological development showed that children with mouth breathing had poorer academic achievement and cognitive skills. Studies on Obligatory mouth breathers showed that during loud reading and exercise had negatively impacted phonation threshold pressure under controlled humidity conditions. [7] Syntactical complexity and difficulty in understanding written language with lower scores than the control group in the arithmetic test, indicating difficulties with numerical operations were noted in mouth breathers. [3, 8, 9] Symptoms similar to those of Attention Deficit Hyperactivity disorder (ADHD) have also been seen in Mouth breathers. [10] MB has been associated with asthma and otitis, Atopic Dermatitis in pre-school children of more than 2 years. The increased potentially of Asthma is due to increased sensitization to inhaled allergens, which highlights the risk of mouth-bypass breathing in the 'one airway, one disease' concept. [11], [12]

Hemodynamic responses in the prefrontal cortex were found to be different in mouth and nasal breathers by causing an increase in oxygen load due to increased Deoxyhemoglobin levels. Mouth breathing was thus shown to result in an increasing oxygen load in the prefrontal cortex when compared with nasal breathing. MB was thus shown to result in an increasing oxygen load in the prefrontal cortex when compared with nasal breathing. This suggests that mouth breathing can be associated with ADHD due to its association with the pre frontal cortex due to central fatigue. During the treatment of ADHD there is a need to evaluate MB must be considered. [13] Otorhinolaryngological findings that were most prevalent in MB were adenotonsillar hypertrophy, tonsilar hypertrophy, adenoid hypertrophy [14] reveling its effect on the upper respiratory tract as a result of dehydration of these structures. Other effects of mouth breathing on the upper respiratory tract included increase of severity of Obstructive Sleep Apnea (OSA) and complicate Continuous Positive Nasal Airway Pressure therapy. Fiber optic nasopharyngoscopy showed that the cross sectional area of retro-palatal and retro-glossal region was reduced suggesting that knowledge of such changes increases OSA affecting therapy in Mouth breathers.

[15] Studies on MB and OSA using 3D multi – detector computed tomography suggested that a more elongated and narrow upper airway during MB may aggravate the collapsibility of the upper airway and thus affect OSA severity. [16] A controlled, analytical cross sectional study involving children aged 8-12 years on the effect of MB on respiration showed that respiratory biomechanics and exercise capability were negatively affected leading to a forward head position that acted as a compensatory mechanism in order to improve respiratory muscle function. [17] Relationship between excursion of the diaphragm muscle and spinal curvature in MB children showed that the subjects exhibited reduced cervical lordosis, increased thoracic kyphosis, increased lumbar lordosis and the position of the pelvis was tilted forward. The distance traveled outwards by the diaphragm muscles of mouth breathing children was shorter than that traveled by the muscles of nose breathing children. [18] The effects on the lung function in MB children showed that enforced oral breathing causes a decrease in lung function in mild asthmatics at rest and sometimes initiating symptoms of asthma since oral breathing may play a role in pathogenesis of acute exacerbations. [19]

Based on studies the effect of MB on the postural effect the following classes were established based on neuronal studies [20] and these postural changes also affect pulmonary function with age.

- Class A: mouth-breathing children with critical postural problems needing spinal rehabilitation care
- Class B: mouth-breathing children with moderate changes to normal posture
- Class C: mouth-breathing children with posture slightly affected

Two other classes were also proposed:

- Class D and E: nose breathers with slightly altered posture

EFFECT ON DENTO-FACIAL STRUCTURES:

The effect of MB not only affects the general health but also the dento facial structures where the process of respiration starts. MB is a risk factor for halitosis, periodontal disease and dental caries due to increased intra-oral pH especially during. Evaluation of the mineralization of tooth and oral microbiota showed that there was a significant difference in enamel mineralization and oral microbiota levels following maxillary expansion due to maxillary arch constriction and high arch, a deformity being one of the effects of mouth breathing. [21]-[26] Effects also extend to the chewing efficiency where evaluation of masticatory variables a longer amount of time is necessary to obtain higher masticatory efficiency when breathing through the mouth. [27] The soft tissue profile in MB showed that the upper lip was more protruded and the lower lip was more protruded and short. The nasolabial angle, nasal prominence and chin thickness were smaller.[28]

Cephalometric analysis showed a significant increase in the upper incisor and lower incisor proclination, depth of mentolabial sulcus, inter-labial distance and facial convexity in MB children. Upper incisor proclination and facial convexity was significantly higher in MB children with adenoids a causative factor for MB. The Cephalometric analysis also showed a more retruded mandible (SNB angle), and a greater inclination of the mandibular plane (NS-Go Gn) and occlusal plane (NS-O Pl) with an increase in anterior lower facial height [29], [30] when compared to nasal breathers. A clinical significance of the effects of MB based on a MRI study that showed that though placement of a rubber dam had no additional influence on upper airway patency shortened mean respiratory duration and decreased tidal volume suggests that rubber dam may disrupt breathing pattern therefore it may be used with caution in patients with MB. [31]

EVALUATION:

Glatzel mirror proves to be a reliable tool clinically identifying participants with and without nasal obstruction [32]. The use of pulse oximetry to detect hypoxia showed that 34.6% of the cases had normal O_2 saturation. 65.4% of cases were hypoxemic with the saturation level below 95% in 42.8% and 95% in 22.6% of cases. Most of the mouth breathing patients were male who were also more hypoxemic, therefore the pulse oximeter can be considered another simple tool to evaluate MB though earlier studies have even used CO_2 sensors. [33], [34] Ultrasonography as a tool in evaluation of muscles of mastication showed that there were definite changes in muscle thickness associated with subjects who underwent exercises revealing that MB contributes to atophy of muscles. [35] The cephalometric pattern of MB and NB children was not similar. Cephalometric measurements of the MB group differed according to the etiology of upper

airway obstruction. The mandible was positioned in an more forward and upward position in children with palatine tonsils when compared with children with enlarged adenoids. [36]

Electromyography (EMG) activity of orbicularis oris (lower fascile) and mentalis muscle showed that MB had increased EMG activity of orbicularis oris during blowing, chewing and pronunciation of certain phoneme \b\ and \m\ with Mentalis showing increased EMG activity during chewing. [37], [38] Investigation into the fatigue of orbicularis oris muscles by EMG showed myoelectric fatigue preceding the feeling of fatigue more precociously in MB.[39]

Non-invasive evaluation techniques such as anthropometric orofacial measurements revealed that there were statistically significant difference between the majority of the orofacial measurements of mouth-breathing children and the measurements of children with no history of speech-language disorders showing that the possibility of comparing orofacial measurements of children with and without mouth-breathing behavior allows the clinician to determine normal and altered structures of the orofacial morphology. Anathropometry being non-invasive, simple and economical with an objective analysis can be used for more advanced evaluation of MB. [40]

MANAGEMENT:

The use of Oral Screen has been seen as a standard treatment protocol for MB. The knowledge of the effect of adjunct therapies must be noted for better understanding the pathogenesis as well as restricting the progress of the condition. The oral screen has been a suitable appliance for lip training which acts buy stretching the lip musculature, providing a force which retroclines the proclined incisors, and lips are strengthened simultaneously. Surgical management alone does not convert oral breathers to nasal breathers without intervention. [41] Speech therapy in combination with beclomethasone diproprionate inhalation had a more effective clinical and functional control of asthma, allergic rhinitis, and MB. [42] Porous Oral Patch which is a porous skin pad consisting of three layers: silicone sheet, polyurethane foam, and polyurethane film, used to treat obstructive sleep apnea and obstructive mouth breathing during sleep has been useful. [43]

DISCUSSION:

Habit is defined as a phenomenon whereby behavior is prompted automatically by seasonal cures, as a result of learned cue behavior associations and it has the potiential to activate behavour in the abscement of awareness, conscious control, and cognitive effort or delibration. Habit may also be viewed as a process by which a stimulus automatically generates an impulse towards action, based on learned stimulus-response associations. It represents habit as a process by which action is cued. This also minimizes conceptual and logical tensions that arise from portraying habit as behaviour, automaticity or any other single element of the wider process.[44] A process such as MB has never been activated or seen as ones behavior, rather with the review it can be more seriously noted as an adaptation by the body in response to a stimuli such as insufficient oxygenation. The vast majority of health care professionals are unaware of the negative impact of upper airway obstruction on normal facial growth and physiologic health. Indian prevalence study on oral habits has detected MB in 4.6% - 6.6% of children. [45, 46] A summary of the effect shows that the dentofacial effects include long, narrow faces, narrow mouths, high palatal vaults, dental malocclusion, gummy smiles, and even leading to skeletal Class II or Class III facial profiles. Sleep deprivation can affect growth and academic performance, leading to diagnosis of attention deficit disorder and hyperactivity. It is important for the entire health care community (including general and pediatric dentists) to screen and diagnose for mouth breathing in adults and in children as young as 5 years of age. [10] Considering the review with the evidence of MB more as an anomaly we have attempted to define MB according to the dental aspect as ‘Compensatory respiration through the oral cavity due to obstruction in the normal passage of respiration leading to disturbances of the orofacial structures when not intervened’.

Surgical procedures such as Adenotonsillectomy may not completely eliminate sleep-disordered breathing result in in progressive worsening of abnormal breathing during sleep requiring post-surgical intervention. [47], Orthodontic effects on the occlusal forces were not seen in persistent MB , [48] therefore the need to correct MB

lays in the hands of both the ENT surgeon and Pediatric Dentist. Nasal breathers become Mouth breathers during intense exercise as compensatory measure occurring as a reflex. Though MB as a compensatory mechanism is due to the inability of the nasal cavity to accommodate the demand for the air intake it may lessen the degree of Exercise Induced Bronchospasm in children with persistent allergic rhinitis and allergic asthma. [49] Since the negative effects are more the intervention of MB is more beneficial when diagnosed and treated early.

CONCLUSION:

MB as a compensatory mechanism originates from the obstruction of the proper channel of respiration. Its effects range from dento-facial to upper respiratory tract changes including its effect on the muscles involved with respiration as well as psychological and postural changes. Such is the extent of the effect of mouth breathing, therefore the depiction of MB has a habit can be further debated. Habits die hard because of their neural imprint and automaticity and can sometimes never satisfy the goals a person sets for himself whereas MB is never a goal set by the person himself but more as a compensatory mechanism therefore we suggest that MB considered as an anomaly and a multispecialty approach to management of MB be incorporated into practice. Hence there is a need to discuss and treat MB as an abnormality considering the complexity of the effects both on the general health and the dento-facial system.

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There are no conflicts of interest.

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