



The Detrimental Effects of Oral Bad Habits on Children's Oral Health and Dental Development

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A B S T R A C T

Oral bad habits refer to external sources, such as nail biting, item biting (e.g., pencils and pens), finger sucking, cheek sucking, and mouth breathing. The act of inhaling and exhaling through the mouth is the predominant behavior that frequently leads to irregularities in the facial composition and misalignment of the teeth. Mouth breathing during the growth and development phase can impact dentocraniofacial growth. Persistent mouth breathing results in muscular anomalies in the vicinity of the mouth, perhaps resulting in malocclusion. The purpose of this review is to delineate detrimental oral behaviors in children and elucidate their repercussions on oral health and dental development.

1. Introduction

Teeth are essential components of the surrounding structures, including the muscles used for chewing, the bones of the jaw, and the overall structure of the face. The structures closely interconnect and interact with each other. Disorders in the growth and development of these tissues can impact the formation of the teeth, and vice versa. Oral habits can impact the hard tissues (tooth and alveolar bone), the tissues that support teeth (gums, periodontal ligament), and various mucosal tissues in the mouth.^{1,2}

Oral bad habits refer to external sources, such as nail biting, item biting (e.g., pencils and pens), finger sucking, cheek sucking, and mouth breathing. The act

of inhaling and exhaling through the mouth is a common behavior that frequently leads to irregularities in the face structure and misalignment of the teeth. Mouth breathing during the growth and development phase can impact dentocraniofacial growth. Persistent mouth breathing results in muscular anomalies in the perioral region, perhaps resulting in malocclusion. Persistent negative oral habits beyond the age of six can lead to dento-facial structural abnormalities, including malocclusion, facial deformities, and palate irregularities. Children older than six years who continue oral habits may experience irregularities in body function and psychological illnesses due to emotional stress caused

by psychological pressure.^{2,3} The objective of this review is to delineate detrimental oral habits in children and their consequential effects on dental growth and oral cavity maturation.

Dental growth

Tooth formation begins during fetal development and continues for several years after birth. It involves the processes of growth, calcification, and eruption. Nutrition has a crucial role in the growth and development of teeth, ultimately impacting their condition post-eruption. Hence, it is imperative to prioritize the nutritional well-being of expectant mothers in order to ensure the development of robust and cavity-resistant teeth. Growth and development are two distinct concepts that often coexist or interchangeably impact one another. Growth refers to alterations in size or values that encompass various aspects of form or function differentiation, including emotional or social changes primarily influenced by interactions with the environment.⁴

In clinical assessment, it is necessary to have a benchmark or normal standard to measure a child's growth. This allows for the comparison of the physiological age of tissue systems with the child's chronological age. Children of the same age can have varying levels of biological maturation. Providing dental care to children during their growth and development phase necessitates specific attention. Consequently, a pediatric dentist must possess expertise in developmental processes, particularly tooth development and its potential deviations. The development of tooth buds commences at 7 weeks of gestation and arises from the ectodermal and mesodermal layers. The ectodermal layer is responsible for the development of tooth enamel and odontoblasts, whereas the mesodermal layer is responsible for the formation of dentin, pulp, cementum, periodontal membrane, and alveolar bone.⁴⁻⁶

Tooth growth and development occur in three distinct stages: growth, calcification, and eruption. The growth stages encompass commencement,

proliferation, histodifferentiation, morphodifferentiation, and apposition. The initiation stage marks the commencement of tooth bud production as buds emerge from oral epithelial tissue, known as the epithelial bud stage. The proliferation stage refers to the rapid multiplication of cells and the enlargement of the enamel organ, also known as the cap stage. Histodifferentiation is the process by which cells undergo histological changes in their organization, resulting in specialization. For example, the inner epithelial cells of the enamel organ transform into ameloblasts, whereas the peripheral cells of the pulp dentin organ become odontoblasts. Morphodifferentiation refers to the process in which cells align at the junction between dentin and enamel, known as the dentin-enamel junction. This alignment determines the shape and size of the crown and facilitates its growth. The apposition stage involves the sequential deposition of the enamel and dentin matrix in successive layers. Ameloblast cells migrate towards the periphery and undergo a calcification process, generating the enamel matrix which results in around 25-30% mineralization.⁶

Calcification is the process of solidifying the matrix through the accumulation of calcium salts. Calcification initiates in the matrix that has previously seen deposition by precipitation, occurring sequentially from one region to another with the addition of layers. During this period, disorders can lead to irregularities in tooth hardness, such as hypocalcification. Genetic or inherited factors influence the progression of this stage, which varies among individuals. These factors impact the process of calcification, the shape of the crown, and the composition of mineralization. Eruption refers to the process by which a tooth moves into the oral cavity. The eruption stage involves attrition and resorption mechanisms. Sustained use during its normal function gradually erodes the tooth surface, a process known as attrition. Meanwhile, the resorption process involves the elimination of the roots of deciduous teeth through the activity of osteoclasts.⁷

Children's negative oral habits

Oral habits refer to behaviors that can lead to alterations in the occlusal connection, such as finger sucking, mouth breathing, lip sucking and biting, protruding the jaw, tongue thrusting, or nail biting. Maladaptive behaviors are actions that pertain to dental and oral well-being and result in atypical jaw or tooth formation. The mentioned detrimental behaviors include thumb sucking, finger sucking, lip sucking, and improper tooth brushing techniques, which can lead to tooth decay and ultimately result in the formation of cavities.⁵⁻⁷

A child's anxiety or trauma can lead to the development of an oral habit as a result of premature weaning, causing them to seek solace by sucking their fingers or nearby items for gratification. To mitigate this, the mother should gradually introduce the child to a new feeding routine, ensuring that the infant has minimal disruption until they become accustomed to it. Adverse situations might heighten children's emotional responses, which manifest as negative oral habits.³ Some common oral practices that can be harmful to children's oral health include.

Thumb sucking

Children commonly exhibit thumb-sucking behavior. If this tendency continues until the age of five or older, it will result in dental malocclusion. Thus, it is imperative to halt it using the most effective psychological strategy. According to the study, finger sucking is a means by which children experience emotions of happiness, affection, and solace. Children engage in finger-sucking behavior on many occasions, such as when they are experiencing drowsiness, slumber, hunger, boredom, daydreaming, or tension.⁸

Finger sucking habitually entails the repetitive or continuous action of placing the thumb or fingers in the mouth, both during the day and at night. There are two types of finger sucking: pathological finger sucking, which occurs as a result of psychological disorders, and non-pathological finger sucking, which persists even after the elimination of psychological disorders in children.

While finger sucking is a typical practice in infants, it is important to address it if it persists beyond the age of 4–5 years. Failure to do so can lead to dental and tissue complications. The severity of this condition is contingent upon the frequency, duration, and strength of the symptoms. In general, prolonged, frequent, or intense execution of a task will result in interference of a very severe magnitude. Excessive activity of the buccinator muscle compresses the upper jaw, resulting in a deep palate and causing dental malocclusion, including an anterior open bite, widening of the distance between the labial teeth of the upper front teeth (overjet), and a double-sided crossbite in the back.^{8,9}

Mouth breathing

Mouth breathing is a parafunctional habit characterized by the passage of air mostly or partially through the mouth instead of the nose. Structural and functional alterations occur in the orofacial region as a result of this habit. There are two categories of mouth breathing: congenital and acquired causes. Congenital mouth breathing is a result of choanal atresia, nostril atresia, and a deviated nasal septum. Acquired mouth breathing typically results from nasal fractures, rhinopharyngitis, chronic adenotonsillitis, chronic hypertrophic rhinitis, adenotonsillar hypertrophy, and malignant and benign tumors.¹⁰

Mouth breathing is a result of a restriction in the air flow through the nasopharyngeal cavity. The obstruction may arise from a deviated septum or allergic rhinitis, as well as from swollen adenoid glands or tonsillitis. Obstruction of nasal breathing compels the child to inhale and exhale through the oral cavity, using the mouth as an alternative route for respiration. The sensory receptors located in the blood vessels and lungs provide signals to the brain, prompting it to augment the volume of air even further. An effective approach involves exerting pressure on the mandible on the floor of the mouth and moving the tongue towards the front to facilitate the entry of air into the larynx. The habit of mouth breathing can lead to dental and soft tissue problems,

including anterior openbite, posterior crossbite with maxillary constriction, and class II malocclusion. Mouth breathing can lead to tooth decay, particularly in the front upper teeth, as it hampers the natural cleaning process and can result in gum inflammation.³⁻⁵

Children who habitually breathe through their mouth exhibit adenoid faces, which are characterized by a lengthy facial structure and a short, slender upper lip. Treating the habit of mouth breathing involves addressing the underlying causes. Typically, the treatment involves surgical intervention. The lower jaw moving in ways that aren't normal causes the main effects if you continue to breathe through your mouth without any changes to your skull, jaw, or skull base. This can cause problems with your oral anatomy and your posture. The tongue positions itself beneath the mouth, facilitating the movement of air through the oral cavity. In cases of tonsillar hypertrophy, limited space squeezes the base of the tongue against the back wall of the throat, pushing the tongue forward even more.¹¹

Lip sucking and biting

Lip biting refers to the act of drawing the lips into the mouth and biting them, often followed by sucking the lips or inserting them between the front teeth of the upper and lower jaws. This behavior typically arises as a manifestation of the emotional stress that an individual undergoes. The impact of this behavior on the teeth and adjacent tissue varies. The lower lip will exhibit dental imprints, appearing red and irritated. To restore the smoothness of the lips, one possible treatment is the application of cold cream or petroleum jelly.

From a clinical perspective, this practice can lead to a significant protrusion of the upper jaw and a pronounced vertical overlap of the front teeth. The lips push the maxillary incisors further forward, while the tongue pushes the mandibular incisors backward. Dental malocclusion, such as an open bite, can occur as a result of the frequency, severity, and duration of

the action. Treatment for this occurrence involves employing a lip bumper.^{10,12}

Protruding the tongue or exerting pressure on the teeth with the tongue

Infants typically protrude their tongue forward during the process of swallowing, which is considered a natural occurrence. An inherent feature of the infant swallowing process is the anterior movement of the tongue, positioning it in a prominent position and adhering to the lower lip. The swallowing process in adults ceases once the permanent teeth start to emerge. However, if there are no alterations in the swallowing process throughout this time, it might lead to dental misalignments such as anterior openbite and maxillary projection. Tongue thrusting refers to three conditions related to the tongue's position: 1) The tongue moves forward and contacts the lower lip or rests between the lower front teeth during swallowing; 2) The tongue rests between the front teeth of the upper and lower jaws while speaking; 3) The tongue rests between the front teeth during periods of rest. A combination of myofunctional therapy and orthodontic treatment effectively addresses the habit of pressing the tongue.¹¹

Onychophagia

The nail-biting habit often emerges between the ages of 4 and 6, intensifies between the ages of 6 and 12, and may persist into adulthood on occasion. The incidence ratio between males and girls is almost equal. Elevated emotional tension is believed to mostly cause the habit of nail biting, although there is no evidence to indicate that this habit might lead to malocclusion of the teeth. If the bite aligns with the long axis of the teeth, there will be no abrasion on the front teeth, and the individual's fingernails will appear short and coarse, necessitating the use of nail care products.^{5,6}

Bruxism

Bruxism, also known as teeth grinding, typically manifests during sleep, hence its nocturnal nature.

However, certain children may also exhibit this behavior during the daytime. Individuals afflicted by this behavior are typically unaware of it; however, they experience symptoms such as masticatory muscle soreness, migraines, and jaw joint issues. The etiology of this oral habit is multifactorial, with some cases attributed to local, systemic, or psychological factors.

Local causes, such as early contact between the upper and lower teeth or insufficient tooth repair, as well as systemic variables like allergies or malnutrition, can cause the habit. The psychological factors that can influence it include psychiatric disorders or heightened emotional stress. The initial approach to treating habitual bruxism involves addressing local causes, such as conservative dental interventions and adjustments to tooth occlusion. In the absence of local causes, a familial approach can explore alternative factors.^{7,8}

Managing detrimental oral habits

Psychological approach

Psychologists tailor the psychological method to the child's age, emotional state, and the severity of the malocclusion. Typically, there is not much focus on preventing this tendency in children who are under the age of three. This is a result of children's underdeveloped emotions. The majority of children typically cease the habit of finger sucking by the age of five. Parents should be vigilant and attentive to discourage their children from engaging in this behavior. One way to take a psychological approach with children is to offer guidance or assistance by employing strategies such as applying bitter-tasting medicine to the child's fingers or implementing a system of rewards and punishments. This system involves an agreement between parents and children that if the child successfully breaks the habit, they will not engage in it again.^{11,12}

Oral myofunctional therapy

Successful resolution of oral habits through myofunctional therapy relies on the child's ability to effectively collaborate. This therapy focuses on

restoring equilibrium, growth, and development of facial muscles by emphasizing the harmonious functioning and pressure of the swallowing muscles. This therapy aims to instruct children in the establishment of a typical swallowing pattern, ensuring healthy functioning of the lips and tongue. Consequently, it can effectively rectify malocclusions, such as anterior open bites, and avoid any relapse following treatment.¹⁰

Surgical treatment

Surgery is performed to rectify irregularities such as a deviated septum, swollen adenoid glands, tonsils, and other similar conditions.⁸

Countermeasures that utilize specialized instruments

Utilizing orthodontic equipment, including both removable and set options, effectively addresses oral habits. Removable appliances come in the form of monoblocks and removable cribs. Monoblock corrects class II malocclusion. The wire is positioned on top of an acrylic plate to create the removable cribs. This instrument serves as a "reinforcement" for youngsters who have the habit of finger-sucking, aiming to discourage the behavior. Additionally, it can address the tendency of tongue-pressing during finger-sucking.^{9,11}

Oral screen

This instrument mitigates the tendency toward mouth breathing. Typically, individuals insert this instrument into their mouth before sleeping, positioning it between their lips and the front section of their teeth. The oral screen serves the purpose of inhibiting the tendency to position the lips or tongue between the upper and lower teeth and inserting fingers into the mouth.⁸

Rakes

Rakes closely resemble cribs in terms of their shape. Rakes closely resemble cribs in terms of their

shape. This gadget eradicates the tendency of finger-sucking, tongue-thrusting, or improper swallowing.⁹

Detachable lip bumper

This technique addresses lip habits, such as lip sucking, and rectifies excessive mental muscle activity. It consists of an acrylic plate, hook, and acrylic pad on the labial side.

Orthodontic appliance

Orthodontic bands

A basic fixed appliance positions the maxillary central and lateral incisors. The orthodontist fashions spurs or posts on the lingual band, orienting them in a downward direction. These spurs prevent children from experiencing the joy of sucking their fingers, as their fingers are unable to exert pressure on the incisors.⁹⁻¹²

Fixed crib

Bands are made on the two upper primary molars and then an arch wire is soldered on the palatine part. In the anterior part, the wire is bent downwards to prevent the finger from coming into contact with the palate. First, place bands on the two upper primary molars. Next, the orthodontist solders an arch wire onto the palatine portion. To avoid any touch between the finger and the palate, the orthodontist curves the wire downward in the front. Following installation, typically within a few days, it will disrupt activities such as eating, talking, and sleeping.⁶⁻⁸

Fixed lip bumper

This method counters lip behaviors, such as lip sucking. It consists of a band or complete crown that is placed on either the primary second molar or the permanent first molar. Using soldering techniques, affix the bar to either the lingual or buccal surface of the crown band. To serve as a cushion, the dentist applies acrylic to the labial area.^{6,7}

2. Conclusion

Oral habits refer to behaviors that can lead to alterations in the occlusal connection, such as finger sucking, mouth breathing, lip sucking and biting, protruding the jaw, tongue thrusting, or nail biting. Both with and without the use of instruments, one can manage detrimental oral habits.

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