



**PBPC**  
ISSN 2674-9432



Qualis A3  
CAPES 2021-2024



DOI - Crossref

Latindex

Indexado no  
Google Acadêmico

## **MOUTH BREATHING, CRANIOFACIAL DEVELOPMENT, AND PEDIATRIC OBSTRUCTIVE SLEEP APNEA: THE ROLE OF DENTISTRY IN EARLY DETECTION**

*Jennifer Vera Santos Gumert<sup>1</sup>, Danielle S. Quindos<sup>2</sup>, Ana Carolina Custódio da Silva de Nadai<sup>3</sup>, Samara de Oliveira Ribeiro<sup>4</sup>, Ediliana Dias Chaves Campos de Amaral<sup>5</sup>, Christian Cesar Soares<sup>6</sup>, Eliane de Carvalho Dourado Aragão<sup>7</sup>*



<https://doi.org/10.36557/2674-9432.2026v5n2p878-894>

Artigo recebido em 17 de Fevereiro e publicado em 17 de Abril de 2026

### **Narrative Literature Review**

#### **ABSTRACT**

Mouth breathing in childhood has gained increasing attention in pediatric dentistry and medicine because of its potential association with craniofacial growth disturbances and pediatric obstructive sleep apnea (P-OSA). Since airway function, facial development, and oral habits are closely interconnected during growth, persistent mouth breathing may reflect or contribute to upper airway dysfunction and abnormal dentofacial development. This review aimed to analyze recent evidence regarding the relationship between mouth breathing, craniofacial development, and pediatric obstructive sleep apnea, with emphasis on the role of dentistry in early detection and interdisciplinary management. A narrative literature review was conducted based on PubMed-indexed studies published between 2021 and 2026. The search strategy included terms related to mouth breathing, pediatric obstructive sleep apnea, craniofacial development, adenotonsillar hypertrophy, orthodontics, and pediatric dentistry. Current evidence suggests that mouth breathing is frequently associated with adenotonsillar hypertrophy, sleep-disordered breathing, altered maxillomandibular growth, posterior crossbite, increased lower facial height, high-arched palate, and malocclusion patterns. Recent findings also highlight the dental and orthodontic setting as a strategic environment for early screening of children at risk for sleep-disordered breathing. Although the relationship is multifactorial and not always causal, available evidence supports the incorporation of airway-oriented assessment into routine pediatric dental examinations. Dentistry plays an important role in the early recognition of craniofacial and functional signs suggestive of pediatric obstructive sleep apnea, contributing to timely referral and multidisciplinary care.



**MOUTH BREATHING, CRANIOFACIAL DEVELOPMENT, AND PEDIATRIC OBSTRUCTIVE SLEEP APNEA: THE ROLE OF DENTISTRY IN EARLY DETECTION**

*Jennifer Vera Santos Gumert<sup>1</sup> et. al.*

**Keywords:** Mouth breathing. Pediatric obstructive sleep apnea. Craniofacial development. Pediatric dentistry. Sleep-disordered breathing.

**Instituição afiliada –**

<sup>1</sup>Specialist in Periodontics, Centro Universitário UniDomBosco, Curitiba, Paraná, Brazil

<sup>2</sup>Specialist in Pediatric Dentistry, FACON, São Paulo, Brazil

<sup>3</sup>Postgraduate Program in Pediatric Dentistry, ABO Rondônia, Porto Velho, Rondônia, Brazil

<sup>4</sup>Postgraduate Program in Orthodontics, FUNORTE, Governador Valadares, Minas Gerais, Brazil

<sup>5</sup>Specialist in Oral Radiology and Dental Imaging, Pontifícia Universidade Católica do Paraná (PUC-PR), Curitiba, Paraná, Brazil

<sup>6</sup>School of Dentistry, Univale, Governador Valadares, Minas Gerais, Brazil

<sup>7</sup>Master's Program in Pediatric Dentistry, São Leopoldo Mandic, Campinas, São Paulo, Brazil

**Autorcorrespondente:**

*Jennifer Vera Santos Gumert*

Email: [jennifergumerta@yahoo.com](mailto:jennifergumerta@yahoo.com)

ORCID: 0009-0007-2023-8437

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).





## **1 INTRODUCTION**

Breathing mode during childhood plays a fundamental role in craniofacial growth, neuromuscular balance, oral function, and overall health. Nasal breathing is considered the physiological route for respiration because it contributes to adequate airway conditioning, stomatognathic balance, and harmonious maxillofacial development. In contrast, persistent mouth breathing has long been associated with functional disturbances, altered facial growth, and compromised oral health, particularly when related to upper airway obstruction (INÖNÜ-SAKALLI et al., 2021; NOSETTI et al., 2023).

In pediatric patients, mouth breathing is often not merely a habit but rather a clinical sign of underlying airway dysfunction. Common causes include adenotonsillar hypertrophy, allergic rhinitis, chronic nasal obstruction, and craniofacial narrowing. When maintained over time, this altered breathing pattern may influence tongue posture, lip seal, mandibular position, swallowing, and orofacial muscle function, potentially affecting craniofacial development during growth (ZHAO et al., 2021; HANSEN; MARKSTRÖM; SONNESEN, 2022).

Pediatric obstructive sleep apnea (P-OSA) is a sleep-related breathing disorder characterized by repeated episodes of partial or complete upper airway obstruction during sleep. It may be associated with snoring, fragmented sleep, behavioral changes, neurocognitive impairment, attention difficulties, poor academic performance, irritability, enuresis, and impaired quality of life. Unlike adults, excessive daytime sleepiness is not always the predominant manifestation in children, which may contribute to underdiagnosis. Recent pediatric evidence has also reinforced the association between airway obstruction and cognitive or behavioral dysfunction, highlighting the systemic relevance of early detection (DURGUN et al., 2023; VAISHNAVI et al., 2026).

Within this context, dentistry—particularly pediatric dentistry and orthodontics—has assumed growing importance in early detection because oral and craniofacial manifestations may represent some of the earliest observable signs of



pediatric sleep-disordered breathing. Since the dental setting routinely involves the evaluation of facial growth, occlusion, oral posture, and oral function, it may serve as an important frontline environment for identifying children at risk. Although the relationship between airway dysfunction and dentofacial development has been increasingly discussed, its clinical implications for pediatric dental screening remain underemphasized in routine practice. Therefore, the present review aimed to analyze current evidence regarding mouth breathing, craniofacial development, and pediatric obstructive sleep apnea, with emphasis on the role of dentistry in early recognition and interdisciplinary management.

## **2 METHODOLOGY**

This study consists of a narrative literature review conducted using the PubMed database. The literature search was performed in March 2026, prioritizing articles published between 2021 and 2026 in order to include recent and clinically relevant evidence.

The search strategy included combinations of the following descriptors and keywords: “mouth breathing”, “pediatric obstructive sleep apnea”, “sleep-disordered breathing”, “craniofacial development”, “adenotonsillar hypertrophy”, “children”, “orthodontics”, and “pediatric dentistry”. Boolean operators such as AND and OR were applied to refine the search and improve retrieval of relevant studies.

The inclusion criteria comprised systematic reviews, narrative reviews, meta-analyses, cross-sectional studies, and clinically relevant observational studies addressing the relationship between breathing mode, upper airway dysfunction, craniofacial development, and pediatric sleep-disordered breathing. Studies focusing on dentofacial morphology, orthodontic screening, adenotonsillar hypertrophy, and oral findings associated with airway dysfunction in children were also considered relevant.

The exclusion criteria included studies not focused on pediatric populations, articles unrelated to oral or craniofacial implications of airway dysfunction, duplicated



studies, and publications with limited relevance to the objectives of the present review.

The selected literature was analyzed qualitatively and organized into the following thematic categories: mouth breathing as a clinical sign of airway dysfunction, craniofacial development and dentofacial consequences, pediatric obstructive sleep apnea, adenotonsillar hypertrophy, and the role of dentistry in early detection and interdisciplinary care.

### **3 RESULTS AND DISCUSSION**

Mouth breathing, craniofacial development, and pediatric obstructive sleep apnea are closely interconnected through functional, anatomical, and developmental mechanisms. Current literature supports the clinical relevance of this association, particularly in growing children, although the relationship remains multifactorial and not always strictly causal. The available evidence suggests that chronic oral breathing may reflect upper airway dysfunction while simultaneously interacting with craniofacial growth patterns and sleep-related breathing disorders.

#### ***3.1 Mouth breathing as a clinical sign of upper airway dysfunction in children***

Mouth breathing in children is a common but often underestimated clinical finding. Rather than being interpreted solely as a behavioral pattern or isolated oral habit, it should be considered a possible marker of upper airway compromise. The literature consistently identifies adenotonsillar hypertrophy as one of the main causes of persistent mouth breathing in pediatric patients, especially in preschool- and school-aged children (INÖNÜ-SAKALLI et al., 2021; ZHAO et al., 2025).

When nasal airflow is chronically impaired, children may adopt compensatory oral breathing to maintain adequate ventilation. Although this adaptation may initially



appear functional, persistent oral breathing can gradually influence lip competence, tongue posture, swallowing pattern, speech, masticatory function, and orofacial muscle balance. In addition, mouth-breathing children frequently present oral manifestations such as gingival inflammation, xerostomia, halitosis, plaque accumulation, and increased susceptibility to dental caries, likely due to reduced salivary protection and altered oral environment (INÖNÜ-SAKALLI et al., 2021).

Recent literature emphasizes that mouth breathing should not be regarded as a benign or self-limited finding, particularly when associated with snoring, restless sleep, daytime irritability, poor concentration, or altered facial growth. In these situations, it may represent a visible sign of sleep-disordered breathing and should prompt broader clinical investigation (VAISHNAVI et al., 2026). This is especially relevant in pediatric dentistry, where recurrent oral and craniofacial signs may precede formal medical diagnosis and create an opportunity for earlier recognition.

### ***3.2 Craniofacial development and dentofacial consequences of chronic mouth breathing***

One of the most clinically relevant aspects of chronic mouth breathing during childhood is its potential association with craniofacial growth. During development, respiration, tongue posture, lip seal, and orofacial musculature act together in shaping the growing facial skeleton. Persistent oral breathing may disrupt this functional balance and contribute to altered dentofacial development (ZHAO et al., 2021; HANSEN; MARKSTRÖM; SONNESEN, 2022).

Several studies have described recurrent dentofacial findings in mouth-breathing children, including increased lower anterior facial height, narrow maxillary arch, posterior crossbite, anterior open bite, high-arched palate, lip incompetence, clockwise mandibular rotation, and mandibular retrognathia. These findings do not necessarily establish a simplistic one-way causal relationship; however, they strongly suggest a clinically meaningful association between airway dysfunction and altered facial growth.



More recent evidence has reinforced the relationship between airway obstruction—particularly adenotonsillar hypertrophy—and dentofacial morphology changes in children seeking orthodontic treatment (ZHAO et al., 2024; ZHAO et al., 2025). This is especially relevant because many of these patients initially present to dental or orthodontic settings, where altered growth patterns may already be evident before formal otolaryngological or sleep assessment is performed.

Recent anatomical reviews have also highlighted that maxillary constriction, vertical growth tendency, mandibular retrusion, and altered craniofacial balance may function as relevant anatomical determinants of pediatric sleep-disordered breathing, reinforcing the biological plausibility of the relationship between chronic oral breathing and airway vulnerability (KIM; KIM; YOON, 2025). Therefore, craniofacial development should not be interpreted in isolation from respiratory function, but rather through an integrated perspective in which airway health and dentofacial growth are dynamically interconnected.

### ***3.3 Mouth breathing and pediatric obstructive sleep apnea***

Pediatric obstructive sleep apnea is characterized by repeated episodes of upper airway obstruction during sleep and is associated with a broad spectrum of clinical consequences, including sleep fragmentation, intermittent hypoxia, neurobehavioral changes, learning difficulties, and reduced quality of life (VAISHNAVI et al., 2026).

Mouth breathing has gained increasing relevance in this context because it may function both as a clinical symptom and as a potential functional contributor to airway dysfunction. Recent systematic evidence has demonstrated a significant association between mouth breathing and pediatric obstructive sleep apnea, suggesting that breathing pattern assessment may be clinically useful in early screening and referral (VAISHNAVI et al., 2026).



This relationship may be explained by a self-reinforcing cycle: upper airway obstruction promotes chronic oral breathing, while chronic oral breathing may contribute to altered craniofacial development, which in turn may further reduce airway patency and increase the risk of sleep-disordered breathing. This “vicious cycle” has been increasingly emphasized in recent literature and provides an important conceptual framework for understanding how breathing mode and facial growth may influence one another over time (NOSETTI et al., 2023; KIM; KIM; YOON, 2025).

However, it is important to emphasize that mouth breathing alone should not be interpreted as a definitive predictor or diagnostic marker of pediatric obstructive sleep apnea. Most available studies are cross-sectional or observational in nature, which limits causal inference. Thus, mouth breathing should be understood primarily as a clinically relevant warning sign that may justify further interdisciplinary evaluation.

### ***3.4 Adenotonsillar hypertrophy and its clinical relevance***

Adenotonsillar hypertrophy is one of the most common causes of upper airway obstruction in children and plays a central role in both mouth breathing and pediatric obstructive sleep apnea. Enlarged adenoids and tonsils may significantly reduce airway caliber and increase airway resistance, particularly during sleep, when upper airway muscle tone decreases.

From a dentofacial perspective, adenotonsillar hypertrophy has been increasingly associated with altered facial growth and occlusal patterns. Recent studies have shown that children with adenotonsillar hypertrophy may present maxillary constriction, posterior crossbite, increased lower facial height, altered mandibular posture, and poor lip competence, among other findings (ZHAO et al., 2024; ZHAO et al., 2025).

This is particularly relevant for pediatric dentists because adenotonsillar hypertrophy is not always recognized early in general healthcare settings, yet its consequences may become visible during routine oral examinations. Signs such as



chronic open-mouth posture, narrow palate, dry lips, gingival inflammation, and a mouth-breathing facial pattern may serve as indirect clinical indicators of upper airway obstruction.

Pediatric dentists and orthodontists do not independently diagnose adenotonsillar hypertrophy or pediatric obstructive sleep apnea; however, they may play a crucial role in recognizing suspicious phenotypes and facilitating timely referral to pediatricians, otolaryngologists, and sleep specialists.

### **3.5 The role of pediatric dentistry and orthodontics in early detection**

The dental office is a strategic environment for identifying children at risk of sleep-disordered breathing because routine oral examinations already include observation of many relevant craniofacial and functional signs. During pediatric dental or orthodontic appointments, clinicians may evaluate lip seal, tongue posture, oral habits, palatal morphology, maxillary constriction, malocclusion, facial profile, and parental reports of snoring or restless sleep.

Recent studies have demonstrated that pediatric orthodontic populations may present a significant prevalence of sleep-disordered breathing risk, reinforcing the importance of screening in dental settings (KANWAL et al., 2025; LEDDA et al., 2026). This is clinically relevant because children undergoing orthodontic assessment may already exhibit structural and functional features suggestive of airway compromise. The main recent studies addressing this relationship are summarized in **Table 1**.

**Table 1. Main recent studies on mouth breathing, craniofacial development, and pediatric sleep-disordered breathing**

<b>Authors / Year</b>	<b>Study Type</b>	<b>Main Focus</b>	<b>Main Contribution</b>
İnönü-Sakallı	Comparative	Adenotonsillar	Demonstrated that children



**MOUTH BREATHING, CRANIOFACIAL DEVELOPMENT, AND PEDIATRIC OBSTRUCTIVE SLEEP APNEA: THE ROLE OF DENTISTRY IN EARLY DETECTION**

Jennifer Vera Santos Gumert<sup>1</sup> et. al.

<b>Authors / Year</b>	<b>Study Type</b>	<b>Main Focus</b>	<b>Main Contribution</b>
et al. (2021)	clinical study	hypertrophy and oral health	with adenotonsillar hypertrophy may present poorer oral health conditions and altered oral function associated with mouth breathing.
Zhao et al. (2021)	Systematic review and meta-analysis	Mouth breathing and facial skeletal development	Reported that chronic mouth breathing in children is associated with altered craniofacial growth patterns and skeletal imbalance.
Hansen, Markström and Sonnesen (2022)	Systematic review	Sleep-disordered breathing and malocclusion	Identified significant associations between sleep-disordered breathing and dentofacial alterations such as crossbite, open bite, and maxillary constriction.
Nosetti et al. (2023)	Narrative review	Adenotonsillar hypertrophy, mouth breathing, and craniofacial development	Proposed a “vicious cycle” model linking upper airway obstruction, mouth breathing, and craniofacial growth disturbances.
Durgun et al. (2023)	Observational pediatric study	Airway obstruction and attention outcomes	Suggested that airway obstruction related to adenotonsillar hypertrophy may also affect attention and behavioral outcomes in children.



**MOUTH BREATHING, CRANIOFACIAL DEVELOPMENT, AND PEDIATRIC OBSTRUCTIVE SLEEP APNEA: THE ROLE OF DENTISTRY IN EARLY DETECTION**

Jennifer Vera Santos Gumert<sup>1</sup> et. al.

<b>Authors / Year</b>	<b>Study Type</b>	<b>Main Focus</b>	<b>Main Contribution</b>
Zhao et al. (2024)	Cross-sectional study	Adenotonsillar hypertrophy and dentofacial characteristics	Reinforced that children seeking orthodontic treatment may present dentofacial phenotypes associated with upper airway obstruction.
Kim, Kim and Yoon (2025)	Comprehensive review	Craniofacial determinants of pediatric sleep-disordered breathing	Summarized anatomical craniofacial risk factors involved in pediatric airway dysfunction and sleep-disordered breathing.
Kanwal et al. (2025)	Cross-sectional study	Risk of sleep-disordered breathing in pediatric orthodontic patients	Highlighted the relevance of screening for sleep-disordered breathing in orthodontic settings.
Zhao et al. (2025)	Systematic review and meta-analysis	Adenotonsillar hypertrophy and dentofacial morphology	Confirmed significant associations between adenotonsillar hypertrophy and craniofacial alterations in growing children.
Vaishnavi et al. (2026)	Systematic review	Mouth breathing and pediatric obstructive sleep apnea	Reinforced the clinical relevance of mouth breathing as a potential marker for pediatric obstructive sleep apnea.
Ledda et al. (2026)	Systematic review	Positive screening for sleep-disordered breathing in	Supported the orthodontic environment as a strategic site for early detection of



<b>Authors / Year</b>	<b>Study Type</b>	<b>Main Focus</b>	<b>Main Contribution</b>
		orthodontic settings	pediatric sleep-related breathing disorders.
Yu et al. (2023)	Systematic review and network meta-analysis	Orthodontic appliances in pediatric OSA	Demonstrated the potential contribution of orthodontic approaches in selected cases of pediatric obstructive sleep apnea management.

In clinical practice, structured history-taking and simple screening strategies may enhance early detection. Questions regarding snoring, restless sleep, daytime mouth breathing, irritability, concentration difficulties, and observed sleep disturbances can be incorporated into routine pediatric dental anamnesis. In addition, tools such as the Pediatric Sleep Questionnaire (PSQ) may be used as screening adjuncts when clinical suspicion is elevated.

Importantly, the role of dentistry is not to replace formal medical diagnosis, but rather to function as an early warning system. Once suspicious patterns are identified, timely referral to pediatricians, otolaryngologists, sleep physicians, speech therapists, or orofacial myofunctional specialists may significantly improve patient outcomes.

Furthermore, recent evidence suggests that orthodontic and dentofacial interventions may contribute to the management of pediatric obstructive sleep apnea in selected cases, particularly through maxillary expansion, growth guidance, and functional orthopedic approaches (YU et al., 2023). This reinforces that dentistry may contribute not only to early recognition, but also to part of the broader interdisciplinary therapeutic pathway.

### **3.6 Clinical implications and future directions**

The integration of airway assessment into pediatric dental practice represents a meaningful advance in preventive and interdisciplinary healthcare. Traditionally, pediatric oral examinations have focused primarily on caries, gingival health, and occlusion. However, current evidence suggests that these evaluations should increasingly incorporate a broader functional perspective that includes breathing mode, facial growth pattern, oral posture, and parental reports of sleep-related symptoms.

Early identification of mouth breathing and craniofacial alterations may contribute to improved recognition and management of pediatric sleep-disordered breathing. The main craniofacial and clinical findings that may alert pediatric dentists to possible airway-related dysfunction are summarized in **Table 2**.

**Table 2. Main clinical signs and dentofacial features suggestive of airway-related dysfunction in pediatric dental patients**

<b>Clinical Finding</b>	<b>Possible Interpretation</b>	<b>Relevance to Pediatric Dentistry</b>
Chronic open-mouth posture	Possible chronic mouth breathing and/or nasal obstruction	One of the earliest visible clinical signs during routine dental examination
Lip incompetence	Orofacial muscle imbalance and altered breathing pattern	Common finding in children with persistent oral breathing
Dry lips and dry mouth	Reduced lip seal and oral breathing habit	May contribute to discomfort, caries risk, and gingival inflammation
High-arched palate	Altered tongue posture and insufficient lateral maxillary development	Important craniofacial sign suggestive of airway-related growth changes
Narrow maxillary arch	Reduced transverse maxillary development	Often associated with posterior crossbite and airway-related



**MOUTH BREATHING, CRANIOFACIAL DEVELOPMENT, AND PEDIATRIC OBSTRUCTIVE SLEEP APNEA: THE ROLE OF DENTISTRY IN EARLY DETECTION**

Jennifer Vera Santos Gumert<sup>1</sup> et. al.

Clinical Finding	Possible Interpretation	Relevance to Pediatric Dentistry
		craniofacial phenotype
Posterior crossbite	Maxillary constriction and altered functional development	Frequently observed in children with chronic mouth breathing
Anterior open bite	Orofacial dysfunction and altered tongue/lip posture	May coexist with oral habits and airway dysfunction
Increased lower facial height	Vertical growth tendency and possible mandibular rotation	Suggestive of altered craniofacial development
Retrognathic mandible	Skeletal pattern that may reduce airway space	Relevant in pediatric sleep-disordered breathing risk
Snoring (reported by parents)	Possible upper airway obstruction or pediatric OSA	Important screening clue during anamnesis
Restless sleep	Possible sleep fragmentation	Suggests need for broader airway and sleep evaluation
Behavioral changes / attention difficulties	Possible impact of sleep-disordered breathing	Relevant pediatric sign often overlooked in dental settings
Frequent gingival inflammation	Oral dryness and altered oral environment	Common oral consequence of chronic mouth breathing
Speech and swallowing alterations	Functional adaptation due to airway or tongue posture changes	Indicates the need for interdisciplinary assessment

Future research should focus on longitudinal airway-growth studies, predictive craniofacial markers, earlier clinical screening models, and the impact of interdisciplinary interventions on both facial development and airway health. There is also growing interest in clarifying the precise contribution of orthodontic treatment,



maxillary expansion, and functional orthopedic approaches to airway-related outcomes in children.

Although the literature strongly supports the relevance of airway-oriented dental assessment, more robust longitudinal and controlled studies are still needed to better define causality and optimize evidence-based screening protocols. Even so, the current body of evidence justifies a broader and more integrative model of pediatric dental care.

#### **4 CONCLUSION**

##### **5**

Mouth breathing, craniofacial development, and pediatric obstructive sleep apnea are closely interconnected through complex and multifactorial mechanisms. Although causality cannot always be definitively established, current evidence strongly supports the clinical relevance of mouth breathing as an early indicator of airway dysfunction rather than a harmless oral habit.

Children with chronic oral breathing may present dentofacial and functional features that are readily observable in routine dental practice, including maxillary constriction, posterior crossbite, lip incompetence, open-mouth posture, altered facial growth, and oral health consequences related to airway dysfunction. Because these signs may emerge before a formal sleep or airway diagnosis is established, pediatric dentists and orthodontists occupy a strategic position in early recognition.

Therefore, incorporating airway-oriented assessment into routine pediatric oral examinations may significantly contribute to the earlier identification of children at risk for sleep-disordered breathing and facilitate timely multidisciplinary referral. This perspective reinforces the expanding role of dentistry within integrative pediatric healthcare and highlights the importance of interdisciplinary collaboration in improving pediatric outcomes.

## 6 REFERENCES

DURGUN, Ceren et al. **Adenotonsillar hypertrophy: the relationship between obstruction type and attention in children.** *Clinical Pediatrics*, [S. l.], v. 62, n. 7, p. 705-712, 2023. DOI: 10.1177/00099228221142952. PMID: 36475879.

HANSEN, Camilla; MARKSTRÖM, Agneta; SONNESEN, Liselotte. **Sleep-disordered breathing and malocclusion in children and adolescents: a systematic review.** *Journal of Oral Rehabilitation*, [S. l.], v. 49, n. 3, p. 353-361, 2022. DOI: 10.1111/joor.13282. PMID: 34779522.

INÖNÜ-SAKALLI, Nilsu et al. **Comparative evaluation of the effects of adenotonsillar hypertrophy on oral health in children.** *BioMed Research International*, [S. l.], v. 2021, p. 5550267, 2021. DOI: 10.1155/2021/5550267. PMID: 33884263.

KANWAL, Leelan et al. **Assessment of the risk of sleep-disordered breathing and its contributing factors in the pediatric orthodontic population: a cross-sectional study.** *Dental and Medical Problems*, [S. l.], v. 62, n. 3, p. 427-433, 2025. DOI: 10.17219/dmp/174615. PMID: 40622285.

KIM, Kyung-A.; KIM, Su-Jung; YOON, Audrey. **Craniofacial anatomical determinants of pediatric sleep-disordered breathing: a comprehensive review.** *Journal of Prosthodontics*, [S. l.], v. 34, suppl. 1, p. 26-34, 2025. DOI: 10.1111/jopr.13984. PMID: 39557815.

LEDDA, Maurizio et al. **Prevalence of positive screening of sleep-disordered breathing among children and adolescents in orthodontic settings: a systematic review.** *Journal of Clinical Medicine*, [S. l.], v. 15, n. 2, p. 802, 2026. DOI: 10.3390/jcm15020802. PMID: 41598739.

NOSETTI, Luana et al. **Exploring the intricate links between adenotonsillar hypertrophy, mouth breathing, and craniofacial development in children with sleep-**



**disordered breathing: unraveling the vicious cycle.** *Children*, [S. l.], v. 10, n. 8, p. 1426, 2023. DOI: 10.3390/children10081426. PMID: 37628425.

VAISHNAVI, Padmanabhan et al. **Association between mouth breathing and pediatric obstructive sleep apnea: a systematic review.** *European Archives of Oto-Rhino-Laryngology*, [S. l.], 2026. DOI: 10.1007/s00405-025-09999-1. PMID: 41524934.

YU, Min et al. **Orthodontic appliances for the treatment of pediatric obstructive sleep apnea: a systematic review and network meta-analysis.** *Sleep Medicine Reviews*, [S. l.], v. 72, p. 101855, 2023. DOI: 10.1016/j.smr.2023.101855. PMID: 37820534.

ZHAO, Tingting et al. **Association between adenotonsillar hypertrophy and dentofacial characteristics of children seeking for orthodontic treatment: a cross-sectional study.** *Journal of Stomatology, Oral and Maxillofacial Surgery*, [S. l.], v. 125, n. 4, p. 101751, 2024. DOI: 10.1016/j.jormas.2023.101751. PMID: 38145836.

ZHAO, Tingting et al. **Is adenotonsillar hypertrophy associated with dentofacial morphology? A systematic review and meta-analyses.** *American Journal of Orthodontics and Dentofacial Orthopedics*, [S. l.], v. 168, n. 5, p. 524-541.e29, 2025. DOI: 10.1016/j.ajodo.2025.04.024. PMID: 40699159.

ZHAO, Ziyi et al. **Effects of mouth breathing on facial skeletal development in children: a systematic review and meta-analysis.** *BMC Oral Health*, [S. l.], v. 21, p. 108, 2021. DOI: 10.1186/s12903-021-01458-7. PMID: 33691678.

-