https://doi.org/10.37723/jumdc.v17i2.1374

J. Univ. Med. Dent. Coll.2026;Vol.17(2):1288-1293
ISSN (Print) 2221-7827, ISSN (Online) 2310-5542
https://www.jumdc.com

Systematic Review

Open Access

Orofacial function improvements from elastodontic appliance use in children: A scoping review

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ABSTRACT

Elastodontic appliances are flexible, prefabricated orthodontic devices that not only guide tooth position but also stimulate the orofacial muscle system and breathing patterns and suppress bad habits. This scoping review aims to identify the outcomes of orofacial function evaluations and the research methodologies used in studies on the use of elastodontic appliances in children. Following the PRISMA-ScR guidelines, a literature search was conducted in PubMed, Scopus, and Web of Science from 2015 to 2025. Included studies evaluated the use of elastodontic appliances involving participants aged ≤18 years, evaluated orofacial function, and reported functional outcomes after elastodontic appliance use. Five studies met the inclusion criteria from 2,662 identified articles. The most widely used prefabricated elastodontic appliance was Myobrace, which was recognized for its effect on orofacial function. Myobrace helps correct poor oral habits such as mouth breathing, tongue thrusting, and lip biting, with good results in terms of dental arch and jaw development.

KEYWORDS: Children, Mixed Dentition, Mouth Breathing, Orofacial Function.

INTRODUCTION

Orofacial function, which includes chewing, breathing, speaking, and tongue position, plays an important role in the growth and development of children [1]. Orofacial dysfunction in childhood can have a negative impact on dental health, jaws, and overall facial development, as well as reduce the quality of life of children. Elastodontic appliances are one of the functional orthodontic innovations designed to correct orofacial muscle imbalances and to improve mouth-breathing habits and tongue position simultaneously [1,2].

A systematic review assesses the existence of evidence to answer very specific questions and often involves meta-analysis, while a scoping review maps the scope and characteristics of the literature without assessing the risk of bias in depth. This scoping review has traced a number of clinical studies on the effectiveness of elastodontic appliances in improving orofacial function, respiratory function and airway, tongue position, jaw and dental arch growth, and Suppression of bad oral habits in children.

However, the existing evidence is scattered across various types of research designs, ranging from case reports and experimental studies to short- term cohort studies, making it difficult to comprehensively map the benefits of elastodontic appliances. There has been no systematic review examining the extent to which this evidence has addressed improvements in orofacial function indicators in children [3,4].

To fill this gap and provide a conceptual framework for further research, a scoping review is needed to map the scope, types, and characteristics of scientific evidence related to the use of elastodontic appliances in children. Following the PRISMA-SCR methodological guidelines for scoping reviews, this study aims to identify, classify, and analyze literature on orofacial function improvement in children treated with elastodontic appliances.

This study will answer two questions: (1) What are the indicators of orofacial function (e.g., respiratory function and airway, tongue position, jaw and dental arch growth, and suppression of oral cavity bad habits) that have been evaluated in studies on elastodontic appliances in children? (2) What research methodologies (study design, population, duration of appliance use, and measurement tools) were used in these studies? The answers to these questions can serve as a basis for the development of clinical guidelines and further research on elastodontic appliances in improving orofacial function in children.

METHODOLOGY

This review followed the PRISMA-SCR guidelines [5]. Two permanent reviewers (AR and ASS) participated in the entire review process. An a priori protocol, including screening and eligibility criteria, was developed prior to conducting the review. No critical appraisal of risk of bias was performed as the purpose of the review was scoping.

How to cite this: *Riski A, Setiawan AS. Orofacial function improvements from elastodontic appliance use in children: A scoping review. Journal of University Medical & Dental College. 2026;17(2):1288-1293.*

The inclusion/exclusion criteria were based on the framework, concepts, and context in the guidelines. The inclusion criteria were as follows: (a) articles published since 2015; (b) articles written in English for detailed data extraction; (c) Articles reporting orofacial function results and evaluation after the use of elastodontic appliances (including respiratory function and airway, tongue position, jaw and dental arch growth, and suppression of oral cavity bad habits). The exclusion criteria were as follows: (a) studies using non-elastodontic appliances; (b) studies that did not evaluate orofacial function.

A literature search was conducted in February 2025 on PubMed, Scopus, and Web of Science for articles published between 2015 and 2025 (see Table 1). After duplicates were removed, all records were screened based on title and abstract, and the full text was evaluated for final eligibility. Additional manual searches were conducted from the reference lists of relevant articles. Two reviewers screened 2,662 initial articles, selected 198 for full-text review, and ultimately selected 5 articles for analysis.

Key information from the included articles was extracted to "describe the results". Items extracted included authors, year of publication, study title, study design, type of elastodontic appliance, duration of treatment, orofacial function outcomes, measurement methods/tools, and results. Each item was extracted by two reviewers independently and cross-validated.

RESULTS

A total of 2,662 records were initially identified, and 5 articles were included in the scoping review after screening and eligibility assessment. Figure-I shows the review process in a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram. At the Identification stage, a search of the PubMed, Scopus, and Web of Science databases with a publication range of 2015–2025 yielded 2,662 articles. Next, all entries were merged, and duplicates were removed. In the Screening stage, the titles and abstracts of the remaining 2,644 articles were evaluated against the inclusion criteria: participants ≤18 years old, use of elastodontic appliances, and reporting of orofacial function outcomes, resulting in 43 articles for full-text review. The Eligibility stage involved full-text review of 43 articles, of which 38 were excluded because they: did not use elastodontic appliances, did not evaluate orofacial function, or were not research articles (e.g., narrative reviews, expert opinions). Finally, 5 studies met all criteria and were included in the map review for further analysis, describing evidence of improved orofacial function in children through the use of elastodontic appliances (Figure-I).

Key information extracted from the five articles in this review is summarized in Table-II. No consistent temporal trends or geographical/cultural patterns were found among the selected studies; articles originated from Europe (Italy), Asia (China), and South America (Brazil). Three studies had a clinical orthodontic context, focusing on malocclusion correction and/or orofacial muscle function; one study focused on pediatric sleep disorders; and another investigated elastodontic myofunctional therapy. All studies used cohort designs, both prospective and retrospective, with follow-up durations ranging from 3 to 12 months. The measurement tools used included lateral cephalograms, surface electromyography, polysomnography, pulse oximetry, and standard clinical evaluations (e.g., assessment of tongue posture and breathing patterns).

Table-I: Search Strategy.

Database	Search Period	Search Date	Search Strategy	Filter/Limitation
PubMed	2015–2025	February 2025	orofacial function" OR "tongue posture" OR "mouth breathing" OR "myofunctional therapy" OR "muscle function" AND "elastodontic appliance" OR "functional orthodontic appliance" OR "myobrace" OR "lm-activator" AND "children" OR "mixed dentition"	English Articles; Children
Scopus	2015–2025	February 2025	orofacial function" OR "tongue posture" OR "mouth breathing" OR "myofunctional therapy" OR "muscle function" AND "elastodontic appliance" OR "functional orthodontic appliance" OR "myobrace" OR "lm-activator" AND "children" OR "mixed dentition"	English Articles; Children
Web of Science	2015–2025	February 2025	orofacial function" OR "tongue posture" OR "mouth breathing" OR "myofunctional therapy" OR "muscle function" AND "elastodontic appliance" OR "functional orthodontic appliance" OR "myobrace" OR "lm-activator" AND "children" OR "mixed dentition"	English Articles; Children

Figure-I: The article selection process is visualized in a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram for the scoping review process.

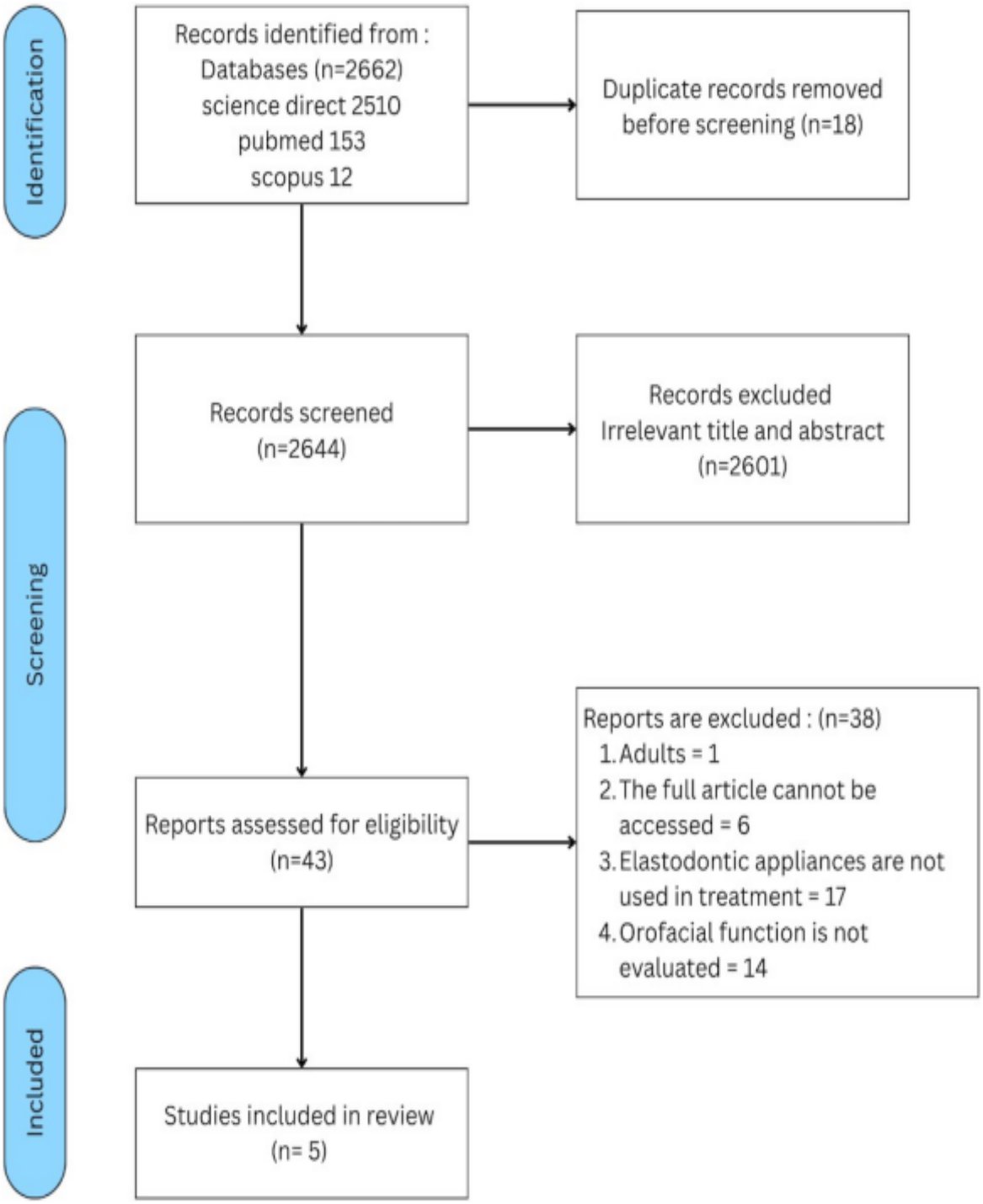

Table-II: Summary of studies included in the scoping review on elastodontic appliances and orofacial function.

No.	Authors (Years)	Title	Study Design	Type of Elastodontic Appliance	Treatment Duration	Orofacial Functions Assessed	Assessment Tools/ Method	Result
1	Levrini et al., 2018 [6]	Efficacy of pre-fabricated myofunctional appliance for the treatment of mild to moderate pediatric obstructive sleep apnea: A preliminary report.	Prospective observational pilot study	Myobrace/MyOSA myofunctional appliance	90 days	Upper airway patency (apnea/hypopnea frequency), oxygenation	Home sleep test (AHI, SaO_2 via HST)	AHI decreased significantly (p=0.0425);mean oxygen saturation improved but did not reach statistical significance. The appliance reduced airway obstruction events in mild– moderate pediatric OSA.
2	E. Ortu et al., 2024 [9]	A. Effectiveness of elastodontic appliances in the treatment of malocclusions: A review of the literature.	Retrospective clinical study with control group	EQ OSA; Occlus-o-Guide® elastodontic devices	6 months to 1 year	Swallowing, phonation, mastication, muscle tone relaxation	Lateral cephalograms, surface electromyography (sEMG), clinical occlusal assessments	Increased upper airway dimension, reduced ANB angle indicating sagittal balance; improved swallowing, phonatory and masticatory function; EMG showed muscle tone relaxation with EQ OSA device.
3	He et al., 2024 [8]	Jaw growth and development in Class II Division I malocclusion. children using the Myobrace® muscle function appliance	Retrospective matched cohort	Myobrace® muscle function appliance	1 year	Maxillary and mandibular sagittal growth; vertical facial growth; dental arch width	Cephalometric X-rays; dental plaster casts	The Myobrace® group showed significantly greater increases in maxillary length (p=0.003) and mandibular length (p<0.001), significant anterior and posterior facial height gains (p<0.05), and greater dental arch width expansion (p<0.001), indicating improved jaw development and arch form compared to muscle training alone.
4	Chuang et al., 2017 [3]	Passive myofunctional therapy applied on children with obstructive sleep apnea: A 6-month follow-up.	Prospective cohort study	Custom mandibular advancement device with tongue bead	6 months	Tongue muscle activity; airway patency; mandibular support	Polysomnography; clinical evaluation	Significant reductions in AHI, hypopnea index, arousal percentage in full-term children; significant REM-AHI and mean heart rate improvements in preterm children, indicating enhanced orofacial muscle function during sleep.
5	Levrini et al., 2023 [7]	The effects of the Myobrace® system on peripheral blood oxygen saturation (SpO_2) in patients with mixed dentition with oral dysfunction	Prospective observational	Myobrace® K-series	12 months	Tongue posture; nasal vs oral breathing	Pulse oximetry (SpO2)	SpO2 increased significantly from 98.03% to 99.07% at rest and from 97.66% to 99.00% with a closed mouth, indicating improved nasal breathing and tongue function during sleep.

DISCUSSION

Improved Respiratory Function and Airway

Several studies have reported that the use of elastodontic appliances improves respiratory function. A previous study demonstrated increased upper airway patency in children with mild sleep disorders after 90 days of using Myobrace MyOSA, as indicated by a decrease in the apnea–hypopnea index (AHI) and an increase in mean oxygen saturation. These findings are consistent with a prior study reporting increased oxygen saturation and fewer sleep desaturation events in users of custom mandibular advancement devices with tongue-retaining features. Both studies demonstrate that elastodontic appliances can open the upper airway by modifying the position of the mandible and tongue, thereby increasing airflow [6,7].

Malocclusion Correction and Jaw Growth

Elastodontic appliances also have a skeletal effect on the maxillofacial region. Children treated with Myobrace® demonstrated greater sagittal growth of the maxilla and mandible than controls, accompanied by widening of the mandibular arch [8]. Improvements in Class II malocclusion, including increased passive molar contact and reduced overjet, were observed after 6–12 months of treatment with Occlus-o-Guide and EQ OSA. These results suggest that the functional pressure generated by elastodontic appliances can stimulate jaw growth and improve dental relationships [9].

Impact on Obstructive Sleep Apnea

Studies on mild-to-moderate apnea show clear benefits. One study found the AHI dropped by an average of 3.2 episodes/hour after 3 months of use [10,11]. Another reported an average AHI reduction of over 50%, underscoring elastodontic appliances as a non-surgical alternative for reducing apnea episodes in children [12].

Improved Oxygenation and Respiratory Function

All studies measuring the oxygen desaturation index (ODI) and the lowest saturation (nadir SpO_2) indicate improvement. The Myobrace® K-series is associated with sustained increases in oxygen saturation during the wake-to-sleep transition and shifts toward nasal over oral breathing over 12 months [13,14]. An average SpO_2 increase of 2.5% further underscores enhanced ventilation efficiency [15].

Advantages and Limitations

The main advantages of elastodontic appliances are their non-invasive, prefabricated nature and their ability the be worn independently by patients at home, thereby increasing compliance. In addition, their multi-factorial effects, including changes in muscles, the skeleton, and respiratory function, offer a holistic approach [16-18]. However, limitations of the studies include small sample sizes, non-randomized cohort designs, and heterogeneity of measurement tools (cephalogram, electromyography, polysomnography, pulse oximetry), which complicate cross-study comparisons. The relatively short follow-up duration (3-12 months) also does not explain long-term stability. The absence of an active control group in some studies increases the risk of selection bias and performance effect [19,20].

Future research must use randomized controlled trials with uniform evaluation standards, a minimum one-year observation period, and qualitative measures of patient experience and compliance. Integrating 3D radiographic analysis and spirometry will strengthen evidence for elastodontics in improving orofacial function. Elastodontic intervention should be part of interceptive orthodontic care and early orofacial management in pediatric dental clinics, particularly for mouth breathing or mild-to-moderate Class II malocclusion. Population, age, and device compliance remain critical factors influencing outcomes.

CONCLUSION

Elastodontic appliances show significant potential in improving respiratory function, correcting malocclusion, and promoting jaw growth in children through increased airway patency and optimization of mandibular and tongue position. The use of Myobrace and Occlus- o-Guide successfully reduced the apnea-hypopnea index and increased oxygen saturation after 6–12 months. Although non-invasive and easy to use, current studies are still limited by small sample sizes, heterogeneity of assessment methods, and the absence of randomized controlled designs. Future recommendations include randomized controlled clinical trials with standardized evaluation criteria to strengthen the evidence of the effectiveness of elastodontic appliances on children's orofacial function.

ACKNOWLEDGEMENT: None.
CONFLICT OF INTEREST: None.
GRANT SUPPORT AND FINANCIAL DISCLOSURE: None.

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Authors Contributions:

Aulia Riski: Substantial contributions to the conception, design of the work, and the acquisition of data for the work. **Arlette Suzy Setiawan:** Drafting the work and reviewing it critically for important intellectual content.

Submitted for publication: 19-12-2025
Accepted after revision: 24-05-2026