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Evidence of orofacial myofunctional therapy patients with asthma and rhinitis: a systematic review

Evidência da terapia miofuncional orofacial em pacientes com asma e rinite: Uma revisão sistemática

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Keywords

Asthma
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ABSTRACT

Purpose: to evaluate the efficacy of orofacial myofunctional therapy in improving orofacial function and nasal breathing in patients with asthma and rhinitis and, consequently, achieve clinical control of these conditions. **Research strategies:** We used the elements of the PICOT method (study population, intervention, comparison, outcomes and type of studies) to define the eligibility criteria: (1) *Population*: patients with asthma and rhinitis; (2) *Intervention*: orofacial myofunctional therapy to improve chewing, swallowing, and breathing; (3) *Comparison*: control group without orofacial myofunctional therapy; (4) *Predefined outcomes*: clinical control of asthma and improvement of orofacial functions and nasal breathing; (5) *Study type*: clinical trials. The data were collected from PubMed, SCOPUS, Web of Science, Science Direct, LILACS, Google Scholar, Cochrane Central Register of Controlled Trials (CENTRAL), OATD, and Open Thesis, in November 2018. **Selection criteria:** Randomized controlled trials published in full-text versions without language restriction, no filter was used. **Data analysis:** Demographic characteristics of study participants, specific diagnosis of asthma and control medication, type, duration, intensity and follow-up of orofacial myofunctional therapy, and outcome data. The risk of bias was assessed according to the Cochrane guidelines for clinical trials. **Results:** One study met the eligibility criteria: although the study has shown an improvement of functional control and clinical scores of asthma, the evidence is very low. **Conclusion:** There is no scientific evidence on the efficacy of orofacial myofunctional therapy in improving clinical control, orofacial function, and nasal breathing in patients with asthma and rhinitis.

Descritores

Asma
Rinite
Fonoaudiologia
Terapia Miofuncional
Revisão

RESUMO

Objetivo: avaliar a eficácia da terapia miofuncional orofacial na melhora das funções orofaciais, na respiração nasal em pacientes com asma e rinite e, consequentemente, alcançar o controle clínico das doenças. **Estratégia de pesquisa**: Utilizamos a estratégia PICOT (população, intervenção, comparação, resultado e tipo de estudo) para definir os critérios de elegibilidade: (1) População: pacientes com asma e rinite; (2) Intervenção: terapia miofuncional orofacial, para melhora da mastigação, deglutição e respiração; (3) Comparação: grupo controle sem terapia miofuncional orofacial; (4) Desfechos pré-definidos: controle clínico da asma e melhora das funções orofaciais e respiração nasal; (5) Tipo de estudo: ensaios clínicos. Os dados foram coletados no PubMed, SCOPUS, Web of Science, Science Direct, LILACS, Google Scholar, Cochrane Central Register de Ensaios Controlados (CENTRAL), OATD, Open thesis, Novembro de 2018. **Critérios de seleção**: Ensaios controlados randomizados publicados em versões de texto completo, sem restrição de idioma, nenhum filtro foi utilizado. **Análise dos dados:** Foram avaliadas as características demográficas dos participantes do estudo, diagnóstico específico de asma e medicação de controle, tipo, duração, intensidade, acompanhamento da terapia miofuncional orofacial e dados do desfecho. O risco de viés foi avaliado de acordo com as diretrizes da Cochrane para ensaios clínicos. **Resultados:** Um estudo atendeu aos critérios de elegibilidade. Embora o estudo tenha mostrado melhora do controle funcional e escores clínicos da asma, as evidências são baixas. **Conclusão:** Não há evidências científicas sobre a eficácia da terapia miofuncional orofacial na melhora do controle clínico, funções orofaciais e respiração nasal em pacientes com asma e rinite.

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INTRODUCTION

Breathing is one of the vital functions of the organism, where any imbalance can cause numerous changes in various organs and systems. Patients with asthma and rhinitis may present respiratory impairment, resulting in unbalance and adaptations in the musculature and/or orofacial structures and stomatognathic functions, due to the presence of nasal obstruction and consequent mouth breathing[1]. The consequences of this unbalance can be observed in the short or long term, such as facial and vocal quality changes, inadequate occlusion, and body posture alterations[2,3]. In addition, mouth breathing exposes the lower airways to the penetration of allergens, irritants and bacterial agents, increasing the risk of asthma exacerbations[4].

The term "united airway disease" has been used to define the strong link between rhinitis and asthma as diseases that share epidemiological, pathophysiological, and clinical characteristics[5]. Even allergic rhinitis has been associated with a lack of asthma control, being one of the most frequent comorbidities of severe asthma. A systematic review with meta-analysis showed that the treatment of rhinitis with intranasal corticosteroids promoted clinical and spirometric improvement of asthma in individuals with both diseases[6].

Orofacial myofunctional therapy is indicated for mouth breathing patients and aims to raise awareness and establish nasal breathing, based on the improvement of the musculature and orofacial function[7]. Other studies have described speech language disorders in patients with asthma and rhinitis and suggest that orofacial myofunctional therapy may be important in the clinical approach[8,9]. Due to the uncertainty about the beneficial effects of orofacial myofunctional therapy on the clinical parameters of asthma and orofacial function, it is important to search for the scientific evidence available to ensure the efficacy of this treatment. Since mouth breathing can have consequences for the craniofacial complex, do patients with respiratory diseases such as asthma and rhinitis undertake other treatment programs such as orofacial myofunctional therapy, in addition to pharmacological treatment, in order to achieve clinical control of the disease?

The objective of this study was to verify if receiving orofacial myofunctional therapy concomitant to drug treatment for asthma and rhinitis is effective to achieve clinical control of the diseases.

RESEARCH STRATEGY

We used the following elements of the PICOT method to define the eligibility criteria: (1) *Population*: patients with asthma and rhinitis regardless of age and gender; (2) *Intervention*: orofacial myofunctional therapy to improve chewing, swallowing, and breathing, (3) *Comparison*: control group without speech therapy; (4) *Predefined outcomes*: clinical control of asthma and improvement of orofacial function and nasal breathing; (5) *Type of studies*: clinical trials (Table 1).

PubMed, SCOPUS, Web of Science, Science Direct, LILACS, Google Scholar, Cochrane Central Register of Controlled Trials (CENTRAL), OATD and Open Thesis were included in the search, which was performed in November 2018. The structured search strategy used the following terms: "Asthmas" OR "Rhinitides" OR "Bronchial Asthma" OR "Asthma" OR "Rhinitis" AND "Speech Therapy" OR "Myofunctional therapy" OR "Orofacial myotherapy" OR "Orofacial myology". To increase the number of resulting eligible articles, no filters were used in the search.

Two reviewers independently screened the search results and identified potentially relevant studies based on the papers' title and abstract. Relevant studies were read in full and selected according to the eligibility criteria. Disagreements between the two reviewers were resolved by consensus or a third reviewer.

Two independent reviewers extracted data from the published reports using a predefined protocol.

SELECTION CRITERIA

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[10]. The systematic review was registered in the PROSPERO database (International Prospective Register of Systematic Reviews).

Two reviewers independently screened the search results and identified potentially relevant studies based on the papers' title and abstract and extracted data from the published reports using a predefined protocol. Relevant studies were read in full and selected according to the eligibility criteria. Disagreements between the two reviewers were resolved by consensus or a third reviewer.

Our search included clinical trials published in full-text versions, without any language restrictions. The search included a manual search of cross-references from original articles and reviews. Studies from which we were unable to extract data on at least one of the predefined outcomes were excluded. We also excluded trials that enrolled patients presenting dimorphism and craniofacial syndromes, neurological diseases, septal deviation, chronic diseases, anatomic obstruction or acute upper airway infection, thumb sucking, use of nursing bottle or pacifier, tonsillar hypertrophy, and orthodontic treatment, as these criteria are confounding factors.

Table 1. Description of the search strategy

Strategy component	Definition	Description
P	Population	Patients with asthma and rhinitis regardless of age and gender
I	Intervention	Orofacial myofunctional therapy to improve chewing, swallowing, and breathing
C	Comparison	Control group without orofacial myofunctional therapy
O	Predefined outcomes	Clinical control of asthma and improvement of orofacial functions and nasal breathing
T	Study type	Clinical trials

DATA ANALYSIS

After reading the selected articles in full, the following data were extracted: demographic characteristics of the study participants, specific diagnosis of asthma and control medication, type, duration, intensity and follow-up of orofacial myofunctional therapy, and outcome data (Table 2).

The risk of bias was assessed according to the Cochrane guidelines for clinical trials. The evaluation considered seven domains: sequence generation and allocation concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective outcome reporting (reporting bias), and other potential sources of bias[11].

RESULTS

The initial search found 9391 articles that were analyzed by title and abstract. Nine studies were considered potentially relevant and were fully analyzed. After a thorough reading, eight articles were excluded—five due to the research design, two to the outcome, and one to intervention. Finally, one study[8] met the eligibility criteria and was included in our systematic review. Our manual search did not identify any additional studies (Figure 1).

Table 2. Characteristics of the study included

Sociodemographic Characteristics	Asthma Diagnosis	Control medication	Orofacial myofunctional therapy
Patients/gender N = 24; 86% male Age group = 6-15 years	Clinical asthma score	Beclomethasone dipropionate through exclusively nasal inhalation	16 sessions, awareness and proprioception mode and type of respiration, posture, muscular exercises. Follow-up in 5 times.

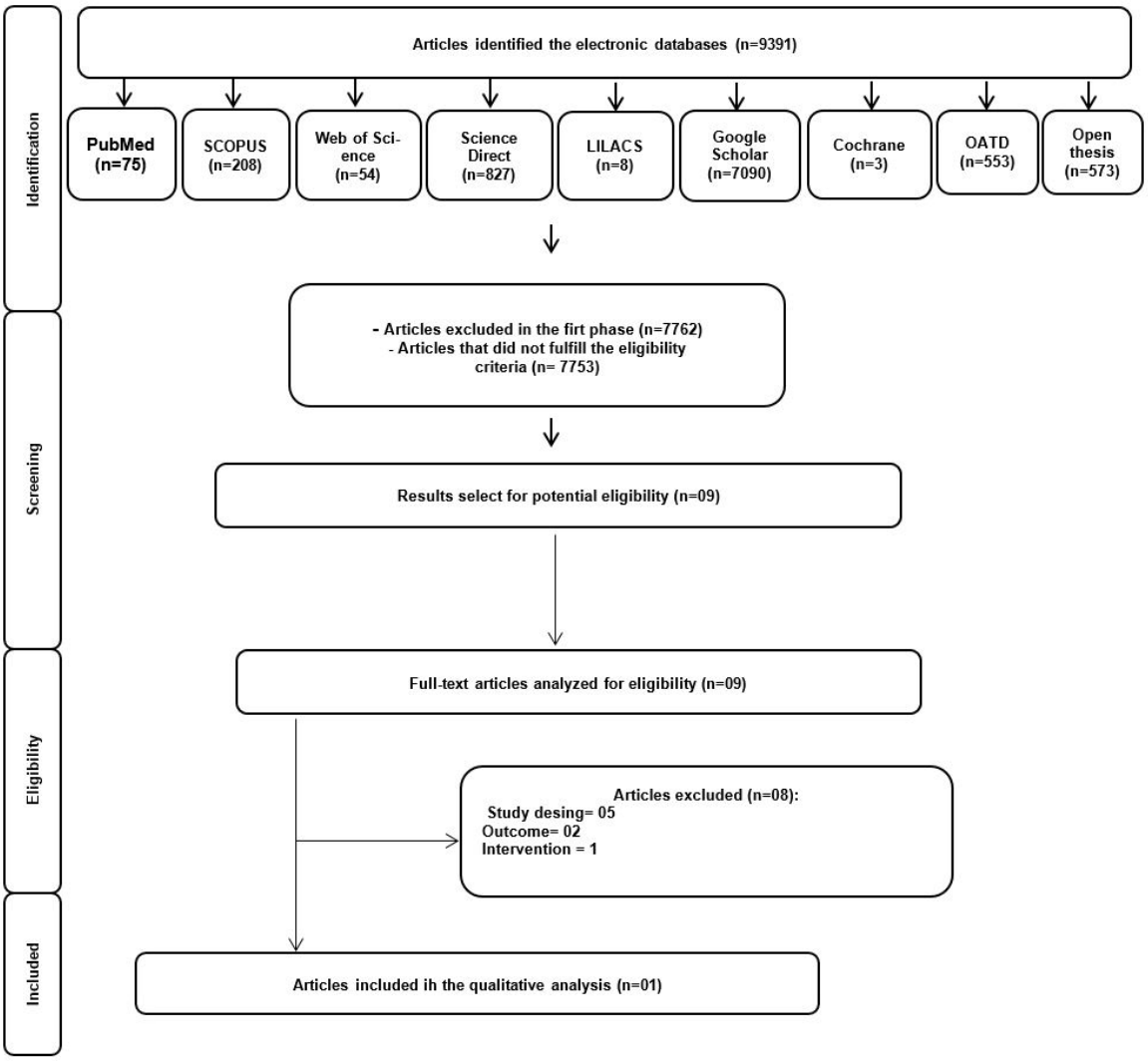

Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram

The study selected was published in 2012 and included 24 participants aged between 6 and 15 years old. The average age of the participants was not reported.

The quasi-experimental randomized study included children and adolescents with asthma, who were divided into two groups: those who did not receive orofacial myofunctional therapy and those who received the intervention. All participants used corticosteroids (beclomethasone 500 mcg/day) exclusively by nasal inhalation, aimed at reaching the upper and lower airways simultaneously, with a 650 ml valve spacer coupled to a face mask. Treatment adherence was monitored by systematically weighing the patients' devices.

The orofacial myofunctional therapy was initiated in the intervention group one month after treatment with inhaled corticosteroids and consisted of muscular exercises to strengthen the lips, tongue and cheeks, as well as exercises to stimulate nasal and abdominal costodiaphragmatic breathing. The individual sessions were 40 minutes long, carried out twice a week, resulting in 16 sessions. All patients used a nasal saline irrigation spray. No specific recommendations were made for environmental control.

The study showed an improvement of functional control of asthma (peak inspiratory flow, peak expiratory flow, mode of respiration, and lip position) especially after eight orofacial myofunctional therapy sessions and an improvement of clinical asthma scores one month after the end of orofacial myofunctional therapy had ceased. The clinical asthma scores, mode of respiration, and lip position were not described.

The orofacial myofunctional therapy protocol used in the study was not well described. The treatment was applied to patients with mouth breathing patterns and the previous results of clinical and functional evaluations of the stomatognathic system are unknown. The exercises used, intervention period, quantity, frequency per week, and the duration of the individual speech therapy sessions were described. However, the number of repetitions of the muscular and respiratory exercises and the type of food and standardization of the consistencies used to evaluate the chewing and swallowing function were not reported. The application of specific techniques and the difficulty in establishing the adequate dosage of muscular training to ensure efficacy and positive results for each patient are not yet established in the literature[12]. The choice of treatment is often based solely on clinical speech-language practice.

Both groups received drug treatment for asthma; however, the study used a nasal inhalation strategy with a valve spacer to reach upper and lower airways at the same time. Guidelines for rhinitis and asthma worldwide recommend using nasal and pulmonary corticosteroids separately[2,13].

The study included in this systematic review was evaluated as presenting a low risk of bias for the random sequence generation and detection bias, since the patients were distributed into groups by a block randomization technique and the outcome assessment was blinded, respectively. However, it was not possible to blind participants and therapists in this study, and a high risk of performance bias was found. In addition, losses (16.7%) in the orofacial myofunctional therapy group and the treatment switches reported in the study may have introduced a high risk of attrition bias. The risk of bias for allocation concealment and selective outcome reporting is unclear. The limited sample size compromises the generalizability of the results.

This systematic review found only one study evaluating the efficacy of orofacial myofunctional therapy in improving clinical control, orofacial function, and nasal breathing in children and adolescents with asthma. In addition, the low quality evidence, reduced sample size, and orofacial myofunctional therapy combined with pharmacological treatment were limiting factors for a pragmatic recommendation. This systematic review showed a lack of evidence concerning the efficacy of orofacial myofunctional therapy for patients with asthma.

Research protocols of the stomatognathic system recommend qualitative and quantitative evaluations of chewing, sucking, swallowing, phonation, and breathing functions, as well as stomatognosia and body posture[6]. A dedicated breathing evaluation using protocols with scores, use of oronasal plaques, and complementary tests for evaluation of muscle weakness and positioning of lips, tongue, and cheeks are recommended. Studies should focus on outcomes that are important for patients with asthma and rhinitis. Validated instruments should be used to measure disease severity scores, quality of life scores and cutoff points for better understanding and application[3].

In the study reviewed[8], no specific protocols with clinical and objective evaluations and robust methodology for accurate and reliable speech and hearing diagnosis were used. In addition, many different interventions were used at the same time with a high number of sessions, which would hardly be replicated in routine clinical practice. This single study demonstrates a methodological bias.

Asthma is one of the most common chronic diseases in childhood and is considered an important public health problem which leads to impairment of the quality of life[14,15]. Its main characteristic is inflammation of the airways, which leads to a condition of hyperreactivity to allergenic exposure and inhalation of irritants, or triggered by physical exercise[2]. Clinical control of asthma is characterized by the absence of diurnal and nocturnal symptoms without the use of beta-agonists for relief and tolerance to exercise[2].

Allergic rhinitis is characterized by comorbidities in children with asthma and is characterized by chronic inflammation of the nasal mucosa and manifested by nasal obstruction, coryza, sneezing, and nasal pruritus[16,17]. Both diseases share epidemiological, pathophysiological, and clinical characteristics, and are defined as "united airway disease."[18] Nasal obstruction is the main problem in rhinitis and may lead to a mouth breathing pattern, craniofacial and dental alterations, and functional impairments in the stomatognathic system[19,20]. Long-term mouth breathing may cause changes in posture, tonus and mobility of the lips, tongue and cheeks, resulting in less efficiency in stomatognathic functions[21]. The premise of the need for orofacial myofunctional therapy treatment is the importance of nasal breathing as an equilibrium factor for the proper functioning of the stomatognathic system.

A recent Cochrane review[3] on nasal rinsing evaluated the effects of nasal irrigation in people with allergic rhinitis. The study concluded that saline irrigation can reduce the severity of the

disease reported by the patient compared to saline irrigation in a period of three months in both adults and children with allergic rhinitis, with no reported adverse effects. Improved functionality with Speech Therapy should be based on approaches with the best scientific evidence, by means of techniques to teach the patient to breathe through the nose, improve tone, and adjust stomatognathic functions. These maneuvers encourage nasal breathing and improve the quality of life of the individuals[7].

Current treatment to control asthma is based mainly on inhaled anti-inflammatory agents and long-acting bronchodilators[2]. In addition, the importance of treating rhinitis to maintain control of the asthma has been demonstrated[22]. Treatment for rhinitis is based on antihistamines and nasal corticosteroids. Antileukotrienes and allergen-specific immunotherapy may be indicated[23]. Although orofacial myofunctional therapy has been proposed as a promising alternative[8], the results of this systematic review showed a lack of evidence on the efficacy of orofacial myofunctional therapy in patients with asthma. This treatment aims to improve nasal breathing and respiratory function of the diaphragm by promoting conditions to maintain nasal breathing, a primary function in the control of respiratory diseases. This therapy is performed with specific exercises for the muscle groups of lips, tongue, and cheeks, the adequacy of chewing, swallowing, sucking, speech and breathing functions, as well as guidance and awareness of body posture[24,25]. A systematic review evaluated the evidence available in the literature on changes in static posture in asthmatics to support clinical practice. The authors suggest that articles on this subject are still insufficient and do not allow for robust evidence; therefore, studies with adequate designs are needed to clarify these questions[26].

It is difficult to draw satisfactory conclusions on the real benefits of orofacial myofunctional therapy from the perspective of small, uncontrolled, and low-quality evidence. The difficulty of finding randomized, controlled clinical trials with a significant sample compromises a pragmatic recommendation for orofacial myofunctional therapy as an adjuvant treatment for patients with asthma.

Additionally, when considering an area of intervention that is not yet established, it may be that a broader range of evidence rather than only randomized controlled trials needs to be included. The lack of evidence in our study also suggests the need for studies with greater methodological rigor in selecting longer-term studies and improving the quality of the evidence.

CONCLUSION

This systematic review showed no scientific evidence about the efficacy of orofacial myofunctional therapy in improving clinical control, orofacial functions, and nasal breathing in children and adolescents with asthma and rhinitis.

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Author contributions

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication as stated by the International Committee of Medical Journal Editors (ICMJE): Ms. BA had full access to all the data and the accuracy of the data analysis. BCLA participated in the idealization of the study, data collection, analysis and interpretation and article writing; ALFM, MGSM and SMS participated in data collection; PRSMF participated, in the condition of guiding, the idealization of the study, analysis, interpretation of data and writing of the article.