Literature Review

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Strategies to train mastication and swallowing in individuals with temporomandibular disorder and orofacial pain: a scoping review

Estratégias para o treino da mastigação e deglutição em indivíduos com disfunção temporomandibular e dor orofacial: uma revisão de escopo

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ABSTRACT

Purpose: To identify and synthesize evidence on strategies used to train chewing and swallowing in individuals with temporomandibular disorder and orofacial pain. **Research strategy:** Scoping review conducted by search in MEDLINE, LILACS, BBO, IBECS, BINACIS, CUMED, SOF, DeCS, Index Psi, LIPECS, and ColecionaSUS (via VHL), Scopus, CINAHL, Embase, Web of Science, Cochrane, and the grey literature: Brazilian Digital Theses and Dissertations Library (BDTD), OpenGrey, and Google Scholar. **Selection criteria:** Quantitative or qualitative studies, with no restriction on time or language of publication, with the following descriptors or keywords: Temporomandibular Joint; Temporomandibular Joint Dysfunction Syndrome; Temporomandibular Joint Disorders; Facial Pain; chewing (Mastication); swallowing (Deglutition); Therapeutics; Myofunctional Therapy; Speech, Language and Hearing Sciences. In the first stage, two reviewers independently screened the studies by title and abstract reading. In the second stage, the reviewers independently read the preselected documents in full text. In case of divergences, a third researcher was consulted. **Results:** The 11 documents included in the review were published between 2000 and 2018. The mostly used training strategies were simultaneous bilateral mastication/chewing, followed by alternating bilateral mastication. In swallowing, increased mastication time was proposed to break food into smaller bits and better lubricate the bolus; training with upper tongue support was also indicated. **Conclusion:** Functional training proved to be effective in rehabilitation, although it was not standardized or performed alone. The studies had low levels of evidence. It is essential to conduct more encompassing and standardized studies, such as randomized clinical trials.

Keywords: Mastication, Deglutition; Temporomandibular Joint Dysfunction Syndrome; Myofunctional Therapy; Speech, Language and Hearing Sciences

RESUMO

Objetivo: identificar e sintetizar evidências sobre estratégias utilizadas no treino da mastigação e deglutição em indivíduos com disfunção temporomandibular e dor orofacial. **Estratégia de pesquisa:** revisão de escopo desenvolvida com consulta nas bases de dados MEDLINE, LILACS, BBO, IBECS, BINACIS, CUMED, SOF, DeCS, Index Psi, LIPECS e ColecionaSUS (via BVS), Scopus, CINAHL, Embase, Web of Science, Cochrane e na literatura cinzenta: Biblioteca Digital Brasileira de Teses e Dissertações (BDTD), *OpenGrey* e Google Acadêmico. **Critérios de seleção:** estudos quantitativos ou qualitativos, sem limite temporal e sem restrição de idioma, que continham os seguintes descritores ou palavras-chave: *Articulação Temporomandibular, Síndrome da Disfunção da Articulação Temporomandibular, Transtornos da Articulação Temporomandibular, Dor Facial, Mastigação, Deglutição, Terapêutica, Terapia Miofuncional e Fonoaudiologia*. Na primeira etapa, dois revisores fizeram a triagem independente dos estudos, por meio da leitura dos títulos e resumos. Na segunda etapa, os revisores leram, independentemente, os documentos pré-selecionados na íntegra. Em caso de divergência, um terceiro pesquisador foi consultado. **Resultados:** as 11 publicações incluídas foram publicadas entre 2000 e 2018. As estratégias mais utilizadas foram o treino da mastigação bilateral simultânea, seguido da mastigação bilateral alternada. Na deglutição, foi proposto aumento do tempo mastigatório para reduzir o alimento em partículas menores e lubrificar melhor o bolo alimentar e treinos com apoio superior de língua. **Conclusão:** o treinamento funcional demonstrou efetividade na reabilitação dos pacientes, embora não siga uma padronização e não seja realizado de forma isolada. Os estudos encontrados apresentam baixo nível de evidência. Considera-se fundamental a realização de estudos mais abrangentes e padronizados, como ensaios clínicos randomizados.

Palavras-chave: Mastigação; Deglutição; Síndrome da Disfunção da Articulação Temporomandibular; Terapia Miofuncional; Fonoaudiologia

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Conflict of interest: No.

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INTRODUCTION

The temporomandibular joint (TMJ) is part of the stomatognathic system and helps make multiple movements, enabling mastication, swallowing, and speech[1].

TMJ overload and nociceptive stimuli may cause biomechanical changes in the stomatognathic system, compensatory muscle behaviors, pain, and even temporomandibular disorders (TMDs)[2]. TMDs encompass a series of neuromuscular and musculoskeletal conditions involving the TMJs, masticatory muscles, and associated tissues[3]. Their etiology is multifactorial, in which the biopsychosocial factors play a relevant role[3]. TMD prevalence ranges from 5% to 12% of the general population[3], while the rate is higher among young people and twice as high in women[4,5].

TMDs have various signs and symptoms, of which the most characteristics are facial pain, otalgia, headache, occlusal wear, clicking, and crepitations[3]. Hence, it is important to investigate the presence of TMD in individuals who complain of orofacial pain (OFP), especially if they occur in functions that involve mandibular movements[6].

Studies have demonstrated the significant presence of orofacial myofunctional disorders in individuals with TMD, especially during mastication and swallowing[5,7]. They most frequently have atypical muscle contractions and atypical tongue behavior in swallowing and mastication, including tongue interposition, chronic unilateral masticatory pattern, premature escape, post-swallowing residues in the cavity, an excessive number of swallows, residue in the vallecula and pyriform sinus, laryngeal penetration, and tracheal aspiration[7-9]. These changes may be ascribed to either myofunctional disorders or painful symptomatology[7-9].

Speech-language-hearing therapists are the professionals responsible for diagnosing and treating orofacial myofunctional disorders in cases of TMD, and the main objective of speech-language-hearing therapy is to restore the orofacial musculature and ensure the best performance of the stomatognathic system[6]. It aims to enable patients to masticate, swallow, and speak without pain or difficulties and prevent their problems from worsening[6].

The literature points out that speech-language-hearing rehabilitation (i.e., orofacial myofunctional training) has proved to benefit TMD patients, balancing orofacial functions and decreasing signs and symptoms[10,11]. As there is a lack of review studies on the topic, this research was conducted to identify and synthesize the strategies and approaches used to train mastication and swallowing in individuals with TMD and OFP.

PURPOSE

The objective of this study was to identify and synthesize in a scoping review the scientific evidence on strategies and approaches used to train mastication and swallowing in individuals with TMD and OFP.

RESEARCH STRATEGY

This study is a scoping review, whose objectives are to synthesize evidence, assess the scope of the literature on a given topic, and help determine whether a systematic review of the literature is needed[12]. The present review was conducted based on international recommendations of the Preferred Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR)[12] and the method proposed by the Joanna Briggs Institute (JBI)[13].

The Population, Concept, and Context (PCC)[13] strategy helped develop the following research question: "What is the scientific evidence on strategies used in orofacial myofunctional therapy to train mastication and swallowing in individuals with TMD/OFP?". In accordance with the research question, the Population was defined as individuals with TMD/OFP; the Concept, as strategies to train mastication and swallowing; and the Context, as orofacial myofunctional speech-language-hearing therapy.

Sources of information and search strategy

Articles were searched between June 2021 and April 2022 in MEDLINE (via PubMed), VHL (LILACS, BBO, IBECS, BINACIS, CUMED, SOF, DeCS, Index Psi, LIPECS, and ColecionaSUS), and Portal CAPES (Scopus, CINAHL, Embase, Web of Science, and Cochrane). The grey literature was also searched in the Brazilian Digital Theses and Dissertations Library (BDTD), OpenGrey[14], and Google Scholar. The search strategies are described in Chart 1.

All strategies were adapted according to specificities in each database. In all of them, the search considered articles published up to April 22, 2022. Final search results were exported to EndNote[15], and duplicates were removed.

SELECTION CRITERIA

Quantitative and qualitative studies were included, with no restriction on time or language of publication. The following descriptors or keywords, obtained from Medical Subject Headings/ Health Science Descriptors and Emtree, were used to search publications: Temporomandibular Joint; Temporomandibular Joint Dysfunction Syndrome; Temporomandibular Joint Disorders; Facial Pain; Mastication; Deglutition; Therapeutics; Myofunctional Therapy; Speech, Language and Hearing Sciences. Studies that did not address orofacial myofunctional therapy as a strategy to rehabilitate mastication and swallowing in individuals with TMD/OFP and articles unavailable in full text in the databases were excluded.

Selection of sources of evidence

In the first stage, two reviewers independently screened the studies for inclusion and title and abstract reading. In the second stage, the reviewers independently read the full text of preselected documents, precisely identifying in detail whether they were relevant to the research and met the inclusion criteria.

Chart 1. Search strategies used in this review

VHL	PubMed and other international databases	Grey literature
("Articulação Temporomandibular"OR"Temporomandibular Joint"OR"Articulación Temporomandibular"OR"Articulation temporomandibulaire" OR "Síndrome da Disfunção da Articulação Temporomandibular"OR"Temporomandibular Joint Dysfunction Syndrome"OR"Síndrome de la Disfunción de Articulación Temporomandibular" OR "Syndrome de l'articulation temporomandibulaire"OR"Síndrome Miofascial de Disfunção Dolorosa Temporomandibular"OR"Síndrome da ATM"OR"Síndrome da Articulação Temporomandibular" OR "Transtornos da Articulação Temporomandibular"OR "Temporomandibular Joint Disorders" OR "Trastornos de la Articulación Temporomandibular" OR "Troubles de l'articulation temporomandibulaire" OR "Transtornos da ATM" OR "Dor Facial" OR "Facial Pain" OR "Dolor Facial" OR"Algie faciale"OR"Dor Craniofacial"OR"Dor Miofacial" OR"Dor Orofacial"OR"Disfunção Temporomandibular"OR "Temporomandibular Joint Dysfunction"OR"Temporomandibular Joint Dysfunctions"OR"Temporomandibular Dysfunction" OR"Temporomandibular Dysfunctions"OR"TMJ"OR"TMJ Syndrome"OR"Temporomandibular Joint Syndrome"OR "TMJ Disease"OR"TMJ Diseases"OR"TMJ Disorder"OR "TMJ Disorders" OR "Temporomandibular Disorder" OR "Temporomandibular Disorders"OR"Temporomandibular Joint Disease"OR"Temporomandibular Joint Diseases"OR "Temporomandibular Joint Disorder" OR "Face Pain" OR "Myofacial Pain") AND (Mastigação OR Mastication OR Masticación OR Mastication OR Deglutição OR Deglutition OR Deglución OR Déglutition OR Swallowing) AND (Terapêutica OR Therapeutics OR Terapéutica OR Thérapeutique OR Terapia OR Terapias OR Tratamento OR Tratamentos OR "Terapia Miofuncional" OR "Myofunctional Therapy" OR "Terapia Miofuncional" OR "Thérapie myofonctionnelle" OR"Miologia Orofacial"OR Fonoaudiologia OR"Speech, Language and Hearing Sciences"OR Fonoaudiología OR Phonoaudiologie OR"Terapia Fonoaudiológica"OR"Tratamento Fonoaudiológico" OR"Terapêutica Fonoaudiológica" OR "Speech Therapy" OR "Speech-language Therapy" OR "Orofacial Myotherapy").	*("Temporomandibular Joint" OR "Temporomandibular Joint Dysfunction Syndrome" OR "Temporomandibular Joint Disorders" OR "Facial Pain" OR "Temporomandibular Joint Dysfunction" OR "Temporomandibular Joint Dysfunctions"OR"Temporomandibular Dysfunction"OR"Temporomandibular Dysfunctions" OR "TMJ" OR "TMJ Syndrome" OR "Temporomandibular Joint Syndrome"OR"TMJ Disease"OR "TMJ Diseases"OR"TMJ Disorder"OR "TMJ Disorders"OR"Temporomandibular Disorder" OR "Temporomandibular Disorders" OR "Temporomandibular Joint Disease"OR"Temporomandibular Joint Diseases"OR"Temporomandibular Joint Disorder" OR "Face Pain" OR "Myofacial Pain") AND (Mastication OR Deglutition OR Swallowing) AND (Therapeutics OR "Myofunctional Therapy"OR"Speech, Language and Hearing Sciences"OR"Speech Therapy" OR "Speech-language Therapy" OR "Orofacial Myotherapy").*	*"Temporomandibular AND Mastication", "Temporomandibular AND Deglutition", "Temporomandibular AND Mastigação" e"Temporomandibular AND Deglutição".*

Divergences between reviewers in either stage were solved with the help of a third reviewer. The process is shown in Figure 1.

DATA ANALYSIS

The data were extracted by one reviewer and confirmed by the second one. Divergences were solved by consensus between three reviewers.

The following data were extracted from the studies: author(s), year of publication, type (article, dissertation/thesis, and government documents), objectives, design, place where the study was conducted, level of evidence, population, and strategies used to train mastication and swallowing in individuals with TMD/OFP. Descriptive statistics were used in the analysis, with absolute and relative frequencies.

The level of evidence and degree of recommendation of the studies were categorized according to the JBI classification[16] and are presented in Chart 2.

RESULTS

The search strategies identified 1,763 documents, of which 1,702 were excluded after reading their titles and abstracts for not meeting the inclusion criteria, and 15 were excluded for being duplicates. Hence, 46 documents were selected to be read in full text. Of these, 35 were excluded – 29 for not addressing strategies to train mastication and swallowing in cases of TMD/OFP, and six for not being available in full text. Lastly, 11 studies were included in this review.

Tables 1 and 2 present the articles with the following data: author(s), year of publication, type (article, dissertation, and government documents), objectives, design, place, level of evidence, population, and strategies used to train mastication and swallowing in individuals with TMD/OFP.

The articles were grouped according to the cause of TMD/OFP. Data extracted from research whose population had muscular and joint TMD are shown in Table 1, while those

from research with TMD originated from ankylosis and trauma are shown in Table 2.

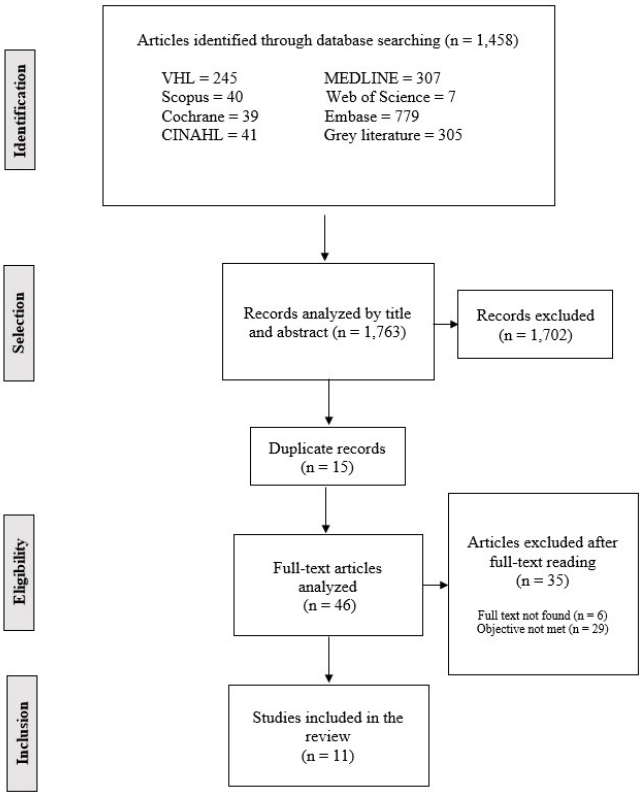

Figure 1. Flowchart of the data collection and selection of the studies that comprise the sample
Subtitle: n = number of publications

Publication characteristics

The 11 studies included in this review were published between 2000 and 2018; nine (81.8%) were published in Brazil[2,10,11,17,18,21-24], and the other two (18.2%) in Israel[19] and the United States[20].

Ten studies[2,10,11,17,19-24] are articles (90.9%) and one (9.1%) is a postgraduate writing project[18]. The levels of evidence were categorized into: 5.b – Expert consensus[17,20] (n = 2); 4.d – Case study[11,21,23,24] (n = 4); 4.c – Case series[10,22] (n = 2); and 2.c – Quasi-experimental prospectively controlled study[2,19] (n = 2). Only two studies were not conducted by speech-language-hearing therapists[19,20].

Therapeutic strategies

Regarding study populations, four (36.3%) were conducted only in women[2,10,19,24], three (27.2%) only in men[11,21,23], one (9%) in both sexes[22], and three (27.2%) did not specify the population[17,18,20]. The subjects' ages ranged from 13 to 68 years.

As for type, one article approached muscular TMD[19], one approached joint TMD[11], three approached both muscular and joint TMD[2,10,24], two approached TMD due to temporomandibular ankylosis[21,22], one approached a case of TMD caused by condylar fracture[23], and three did not report the type of TMD[17,18,20].

The most used strategy to train mastication was simultaneous bilateral mastication, followed by alternating bilateral mastication (four studies – 36.3%)[2,10,11,24]. Studies whose patients had temporomandibular ankylosis reported unilateral mastication training, followed by alternating bilateral mastication (one study – 9.09%)[22] and alternating unilateral mastication (one article – 9.09%)[21]. Unilateral mastication training contralateral to the fracture was also cited in one study approaching condylar

Chart 2. Level of evidence and degree of recommendation of studies, according to the classification by the Joanna Briggs Institute[16]

LEVEL OF EVIDENCE	DEGREE OF RECOMMENDATION
Level 1: Experimental designs	1.a – Systematic review of randomized controlled clinical trials
	1.b – Systematic review of randomized controlled clinical trials and other study designs
	1.c – Randomized controlled clinical trial
	1.d – Pseudo randomized controlled clinical trial
Level 2: Quasi-experimental designs	2.a – Systematic review of quasi-experimental studies
	2.b – Systematic review of quasi-experimental studies and other lower study designs
	2.c – Quasi-experimental prospectively controlled study
	2.d – Pre-test – post-test or historic/retrospective control group study
Level 3: Observational-analytic designs	3.a – Systematic review of comparable cohort studies
	3.b – Systematic review of comparable cohort and other lower study designs
	3.c – Cohort study with control group
	3.d – Case-controlled study
	3.e – Observational study without a control group
Level 4: Observational-descriptive designs	4.a – Systematic review of descriptive studies
	4.b – Cross-sectional study
	4.c – Case series
	4.d – Case study
Level 5: Expert opinion and bench research	5.a – Systematic review of expert opinion
	5.b – Expert consensus
	5.c – Bench research/single expert opinion

Table 1. Characterization of the publications, including author(s), year, type, objectives, study design, place, and level of evidence

Author(s)	Year	Type	Objective	Design	Place	Level of evidence
Bacha and Rispoli[17]	2000	Article	To present two clinical approaches to mastication in orofacial myofunctional disorders.	Expert consensus/ Qualitative	Brazil	5.b
Nogueira[18]	2001	Postgraduate writing project	To explore, in speech-language-hearing therapy, the existing relationship between temporomandibular disorders (TMD) and stomatognathic functions, particularly mastication.	Qualitative	Recife, Brazil	-
Gavish et al.[19]	2006	Article	To test the hypothesis that, by strengthening masticatory muscles with a controlled mastication exercise protocol, muscle function is improved, pain is eased, both at rest and in the function.	Quasi-experimental prospectively controlled study/ Quantitative	Tel Aviv, Israel	2.c
De Felício et al.[11]	2007	Article	To describe a case of TMD with clinical signs of hypermobility treated with orofacial myofunctional therapy and occlusal splint.	Case study/ Qualitative	São Paulo, Brazil	4.d
De Felício et al.[2]	2010	Article	To analyze the effects of orofacial myofunctional therapy on individuals with combined muscular and joint TMD.	Quasi-experimental prospectively controlled study/ Quantitative	Ribeirão Preto (SP), Brazil	2.c
Nasri-Heir et al.[20]	2016	Article	To present guidance recommendations to physicians to help patients with painful TMD improve the quality of their diets and avoid or minimize the pain related to eating.	Expert consensus/ Qualitative	United States	5.b
Melchior et al.[10]	2016	Article	To analyze the effect of orofacial myofunctional therapy on the treatment of patients with TMD after analgesia with low-level laser therapy.	Case series/ Qualitative	Ribeirão Preto (SP), Brazil	4.c

Table 2. Characterization of the publications on temporomandibular ankylosis and condylar fracture, including author(s), year, type, objectives, study design, place, and level of evidence

Author(s)	Year	Type	Objective	Design	Place	Level of evidence
Marzotto and Bianchini[21]	2007	Article	To present an orofacial myofunctional therapy approach, its procedures, and results in a case of bilateral temporomandibular ankylosis.	Case study/ Qualitative	São Paulo, Brazil	4.d
Bautzer et al.[22]	2008	Article	To assess the role of speech-language-hearing therapists in the treatment of seven patients with temporomandibular ankylosis, after surgical procedure.	Case series/ Qualitative	São Paulo, Brazil	4.c
Bianchini et al.[23]	2010	Article	To present the procedures and results of nonsurgical treatment associated with orofacial myofunctional therapy in a clinical case of comminuted condylar fracture caused by a firearm bullet.	Case study/ Qualitative	São Paulo, Brazil	4.d

fracture (9.09%)[23]. Another study cited alternating unilateral mastication training and, after good muscle conditions were achieved, alternating bilateral mastication (9.09%)[18].

Also concerning mastication, four articles (36.3%) suggested training to guide and control consistency, quality, volume, texture, masticatory rhythm, and lip closure[17,20,23,24]. In two of

them (18.1%), masticatory training initially involved soft food to gradually organize and restore eating[20,23]. Another study (9.09%)[24] conducted usual conscious mastication exercises with different foods, broadening the perception of sensations, such as pain, easiness, difficulty, differences between the sides, and physical and taste characteristics of foods.

Nine studies (81.8%) proposed functional training with foods and/or liquids[2,10,11,18,20-24]. One of them proposed not using direct mastication and swallowing therapy in individuals with TMD[17]. Another study (9.09%) proposed a controlled exercise protocol for chewing gum for 8 weeks[19], while another article that addressed temporomandibular ankylosis (9.09%) occasionally trained mastication with rubber tubes in the final phase of treatment[21].

Only five articles (45.4%) trained swallowing[2,10,11,23,24]. Two studies (18.1%) proposed that participants increase the mastication time to break food into smaller parts and better lubricate the bolus[2,11]. Two articles (18.1%) used directed swallowing training with upper tongue support and wave movements to drive the bolus to the pharynx[23,24]. Lastly, one article (9.09%) used food to train mastication, coordinate the masticatory cycle pattern, ease the pain, and minimize joint noises; it likewise trained swallows, so they would be effortless and painless[10]. The study results regarding population and strategies used to train mastication and swallowing are summarized in Table 3.

Table 3. Characterization of the publications, including population and strategies to train swallowing and mastication in cases of temporomandibular disorder/orofacial pain

Author(s)	Population	TMD diagnosis	Strategies
Bacha and Ríspoli[17]	All age groups	-	It was proposed not to use direct mastication and swallowing therapy in individuals with TMD. Instead, therapy should guide and control consistency, quality, volume, masticatory rhythm, and lip closure when eating. Patients are given such information in writing, along with charts to record their daily diet. The information is discussed with the therapists in the session.
Nogueira[18]	-	-	Mastication must be initially alternating unilateral and then bilateral, with cyclic movements and adequate and symmetric muscle strength. The diet is initially changed to soft food, avoiding the overload of orofacial structures; pureed to minced food is maintained, gradually returning to more solid food. Masticatory training should use only foods.
Gavish et al.[19]	Women 20 to 45 years old	Muscular TMD	It proposed a controlled exercise protocol for chewing gums for 8 weeks.
Marzotto and Bianchini[21]	Man 28 years old	Temporomandibular ankylosis	Alternating unilateral mastication training, directing unilaterally the buccinator contraction and tongue lateralization mechanisms. Masticatory training with consistent foods of various textures, taking small or medium portions of food. Occasional training with rubber tubes in the final phase of the treatment (because it is ankylosis).
De Felício et al.[11]	Man 49 years old	Joint TMD	The patient was instructed to masticate simultaneously on both sides. Alternating bilateral mastication training began after the patient had better developed the muscle conditions. As for swallowing, the patient was instructed to increase the mastication time to break food into smaller parts and better lubricate the bolus.
Bautzer et al.[22]	Both sexes; median age of 15 years	Temporomandibular ankylosis	Unilateral e bilateral mastication exercises.
De Felício et al.[2]	40 women aged 13 to 68 years	Muscular and joint TMD	Patients with unilateral mastication were first instructed to masticate simultaneously on both sides. Alternating bilateral mastication training must begin after the patient improved muscle function and dental occlusion does not cause functional overload. As for swallowing, patients were instructed to increase the mastication time to break food into smaller parts and better lubricate the bolus. Tongue, lip, and cheek contraction, mobility, and coordination exercises also help perform this function.
Bianchini et al.[23]	Man 20 years old	Condylar fracture	Systematic unilateral mastication training contralateral to the fracture, directing unilaterally the buccinator contraction and tongue lateralization mechanisms, inducing rotatory mandibular movement. Masticatory training used soft foods, initially passing to varied textures to gradually organize and restore eating. Directed swallowing training with upper tongue support and wave movement, without pressure on perioral musculature, and perception of soft laryngeal elevation movement.
Nasri-Heir et al.[20]	-	-	The authors suggest mincing well all foods, choosing moist foods or moistening them with sauces until finding a comfortable consistency, peeling fruits and vegetables; chopping food into consistencies that can be comfortably taken when opening the mandible, taking small bites, and masticating slowly.

Subtitle: TMD = temporomandibular disorder

Table 3. Continued...

Author(s)	Population	TMD diagnosis	Strategies
Melchior et al.[10]	Women 50 to 61 years old	Muscular and joint TMD	The procedures for each stage, based on the article by De Felício et al.[2], vary according to the patient and rehabilitation needs. Food was used in mastication training to coordinate the masticatory cycle pattern, ease the pain, and minimize joint noises (respectively in cases of arthralgia and disk displacement with reduction); swallowing was trained likewise so that it would be effortless and painless.
Melchior et al.[24]	Woman 35 years old	Muscular and joint TMD	Usual conscious mastication training with different foods, broadening the perception of sensations such as pain, easiness, difficulties, differences between the sides, and physical and taste characteristics of foods. Simultaneous bilateral mastication training – i.e., masticating a portion of food on each side of the mouth at the same time. Training to swallow water and foods, instructing to place the tip of the tongue against the anterior region of the hard palate, with wave movements in the body of the tongue in the anteroposterior direction, to drive the bolus to the pharynx.

Subtitle: TMD = temporomandibular disorder

DISCUSSION

Mapping the literature on strategies used to train mastication and swallowing in patients with TMD and OFP, 11 publications were identified; 54.5% of them were case studies or case series[10,11,20-23]. Only two studies were not conducted by speech-language-hearing therapists[19,20]. Brazil is the country with the most publications on the topic, which shows the important role of oral-motor function both nationwide and worldwide. However, most studies had low levels of evidence.

A systematic review of the topic is needed. Nevertheless, since the level of evidence found in the studies is low, the evidence on the topic must first be improved with further randomized clinical trials.

The strategies used in the studies do not follow a defined treatment protocol. The oldest article[17] does not approach direct therapy with foods. The most recent ones[20,23,24] have a more detailed approach to both direct and indirect therapy to train the functions.

No publication was found addressing orofacial myofunctional therapy, which exclusively trains stomatognathic functions in cases of TMD and OFP. In most studies, functional therapy was employed or suggested in combination with other resources, such as relaxation strategies, massages, thermotherapy, and mandibular exercises[2,10,11,18,21-24] – which made it difficult to clearly verify the contribution of functional therapy in these cases. These therapies have already demonstrated good results, easing the patients' pain and improving their muscle and functional performance[2,10,11,18,21-24].

Thus, it is important to define effective functional strategies to treat TMD and OFP. Rehabilitating functions is the main objective of speech-language-hearing therapy, preventing pain and difficult mandibular movements from perpetuating or worsening.

The literature has demonstrated that individuals with TMD have mastication and swallowing changes, which worsens the performance of these functions[5,7,25-29]. In a study that assessed signs, symptoms, and associated factors in individuals with TMD, all patients reported masticatory problems, including unilateral mastication, difficulties with hard food, fatigue, pain, and jaw locking[30]. Another study conducted a bibliographic survey on orofacial myofunctional disorders in individuals with TMD. It found the following aspects of mastication and swallowing: changed masticatory behavior, reduced bite force, greater masticatory frequency, preferential or chronic unilateral mastication with compensatory tongue movements, reduced masticatory stability, more masticatory thrusts, increased mastication time, inefficient mastication, atypical swallowing, changed lip and tongue posture in swallowing, and signs of oropharyngeal dysphagia[31].

The analysis of the articles showed that, even though they used various non-standardized strategies, they agree mutually and with the literature in terms of clinical findings, signs, and symptoms in patients with TMD[7-9].

It is important to guide and control the consistency, volume, masticatory rhythm, and lip closure when eating[17,18,20,21,23], as they provide an adequate basis for mastication and swallowing. Articles reported conscious exercises with the usual mastication of different foods, which are important to broaden the perception of sensations such as pain, easiness, difficulties, differences between the sides, and the physical and taste characteristics of foods[10,24]. Alternating unilateral mastication training was also reported, which aims to induce rotatory mandibular movements[18,21-23]. Simultaneous bilateral mastication was used when the masticatory load had to be divided to avoid condylar translation[2,10,11,24]. Lastly, alternating bilateral mastication was indicated after patients had better developed the muscle conditions[2,10,11,18,22,24].

As for swallowing, individuals in the studies were instructed to increase the mastication time to break food into smaller parts and better lubricate the bolus[2,10,11]. Directed swallowing training with upper tongue support and wave movements, without pressure on perioral muscles, and perception of laryngeal elevation movement were also indicated[23,24].

The quality of food is known to have a great impact on people's lives. Therefore, mastication and swallowing difficulties, especially when they involve pain and discomfort, significantly impair their quality of life[28].

The studies presented here demonstrate the importance of functional rehabilitation in TMD and OFP treatment, even though the literature on the topic is still scarce. Hence, further studies should be conducted with standardized methodologies.

CONCLUSION

The approaches and strategies used in the studies to train mastication and swallowing in individuals with TMD and OFP have proved to be effective in functional rehabilitation. However, the strategies are not standardized and are always combined with other resources and strategies.

The studies have a low level of evidence and are mostly qualitative. It is essential to conduct more encompassing studies, with standardized methodologies, such as randomized clinical trials, to better define the strategies and reinforce the importance of functional rehabilitation in TMD and OFP treatment.

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