

# Orofacial myofunctional speech-language-hearing teletherapy program focusing on chewing and swallowing in temporomandibular disorders

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## ABSTRACT

**Purpose:** to propose a myofunctional speech-language-hearing teletherapy program focusing on chewing and swallowing for individuals with temporomandibular disorder.

**Methods:** the first stage included a scoping review, which found strategies that served as a basis for creating the program. In the second stage, a speech-language-hearing pathologist specializing in oral motor therapy applied the initial version of the therapeutic protocol to 29 patients diagnosed with temporomandibular muscle dysfunction, seeking to verify the instrument's applicability. In the third stage, three speech-language-hearing pathologists specializing in oral motor therapy analyzed the protocol and suggested changes.

**Results:** the version created from the scoping review was applied to 29 participants, making no adjustments in this stage. All format modifications suggested by the specialists were accepted, whereas content changes were accepted when at least two participating professionals agreed, who suggested minor changes. The final protocol version had 14 sessions – the first and last for assessments and the rest for therapy.

**Conclusion:** the program was created, adjusted, and presented, aiming to assist and guide professionals in orofacial myofunctional speech-language-hearing teletherapy with this population. Further research is greatly important to validate this instrument.

**Keywords:** Temporomandibular Joint Dysfunction Syndrome; Deglutition; Mastication



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## INTRODUCTION

Orofacial pain refers to pain associated with the soft and mineralized head, face, and neck tissues<sup>1</sup>. Temporomandibular disorders (TMDs) are considered the leading cause of non-dental pain in the orofacial region<sup>2-4</sup>. These clinical changes affect the temporomandibular joint (TMJ), masticatory muscles, and/or associated structures<sup>1,3</sup>. Acute or persistent pain is frequent in these cases, worsening the person's quality of life<sup>4</sup>. TMDs can be classified into two subgroups: arthrogenous (with signs and symptoms directly related to the TMJ) and myogenous (related to the masticatory muscles)<sup>3,5-7</sup>.

TMDs are multifactorial, requiring multidisciplinary care<sup>2</sup> and a thorough dental diagnosis for treatment, considering the etiology of the disorder. Some authors in the literature have emphasized the need to combine multiple therapeutic methods, the most common being pain education, cognitive behavioral therapy, manual therapy, occlusal splints, and pharmacological treatment<sup>8-10</sup>. Another possibility they describe is orofacial myofunctional therapy performed by a speech-language-hearing (SLH) pathologist to recover the stomatognathic system's functioning with minimal or no limitation (no pain, discomfort, or worsened problem) when chewing and/or swallowing<sup>11,12</sup>. For some authors, swallowing and chewing are the orofacial functions most affected in individuals with TMD<sup>13</sup>. They commonly have muscle contractions and atypical tongue behaviors during swallowing and chewing, increased chewing frequency, chronic unilateral chewing pattern, and excessive number of swallows when performing these functions<sup>13-16</sup>. According to the literature, orofacial myofunctional training has shown benefits for patients with TMD, balancing orofacial functions and reducing signs and symptoms<sup>17-21</sup>. However, the few articles that address the topic of therapy do not present a specific program approaching chewing and swallowing. Moreover, intervention reports are brief and succinct.

In recent years, after the pandemic, SLH teletherapy has become part of the professionals' reality. There is still little research on its use, but studies demonstrate good results<sup>22,23</sup>. SLH teletherapy expands SLH services and provides access to SLH therapy for patients who live in regions with a shortage of specialized professionals<sup>22,24</sup>. The advantages of teleconsultation include greater attendance, no need to use resources such as transportation and the health service's facilities, and more flexible hours<sup>22</sup>.

Thus, this study aimed to propose a myofunctional SLH teletherapy program focusing on chewing and swallowing for individuals presented with TMD.

## METHODS

This research was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais, MG, Brazil, under CAAE 48043821.5.0000.5149 and evaluation report 5.385.556. This article is part of an ongoing study. The therapeutic protocol development process had three stages, based on a similar previous study on orthognathic surgery<sup>25</sup>.

The first stage comprised a scoping review<sup>26</sup>, which enabled the development of the initial version of the therapeutic protocol. The therapeutic strategies and procedures most frequently described in studies addressing chewing and swallowing training in individuals with TMD were selected, as well as other procedures considered relevant based on the authors' clinical experience. After researching and reviewing the literature, the main training strategies were listed and served as a basis for creating the therapeutic program, with 12 treatment sessions held once a week.

The second stage aimed to verify the instrument's applicability. An SLH pathologist specializing in oral motor therapy and trained in orofacial pain applied the initial version of the therapeutic protocol to 29 patients diagnosed with myogenous TMD. The study's inclusion criteria were a diagnosis of myogenous TMD; age between 18 and 60 years; pain intensity  $\geq 4$  on a visual numeric scale; presence of central and lateral incisor teeth; absence of neurological, cognitive, dental, or bone impairments; absence of treatments for TMD and/or sleep disorders; absence of continuous medication use; having access to the Internet and the audio and video transmission platform; signing an informed consent form. The exclusion criterion was not performing the requested activities. After an in-person assessment by a blind evaluator, 12 weekly treatment sessions<sup>18</sup> were held synchronously via Google Meet, lasting 30 to 40 minutes each. Participants underwent orofacial myofunctional therapy focusing on chewing and swallowing, in addition to general oral and written guidelines on pain education.

In the third stage, three judges (SLH pathologists specializing in oral motor therapy) with at least 10 years of experience in treating individuals with TMD analyzed the protocol content, considering its objectives and number of sessions, therapeutic strategies, the relationship between the objectives and strategies, the

understanding and clarity of procedure descriptions, the assessments, additional explanatory information in the footer, and the general overview of the protocol<sup>26</sup>. The latter was not reapplied after the experts' evaluation because there were no substantial changes.

## RESULTS

The proposed Orofacial Myofunctional SLH Teletherapy Program focusing on chewing and swallowing in TMD had 12 treatment sessions with guidance strategies and masticatory training in all consultations and swallowing training in the last five.

The strategies found in the literature review approached training in orientation and control of the following aspects: texture, chewing rhythm, consistency, quality, volume, and lip sealing<sup>27-30</sup>; performing habitual chewing exercises with different foods, stimulating the patient's perception of sensations such as pain, ease, difficulty, difference between sides, physical and taste characteristics of the foods; functional training with foods and/or liquids<sup>28,30,31</sup>; and training in alternating unilateral chewing, simultaneous bilateral chewing, followed by alternating bilateral chewing<sup>20,31</sup>. Regarding swallowing, the following strategies were found: increasing chewing time to reduce food into smaller particles and better lubricate the food bolus<sup>28,32</sup> and swallowing training with the tongue resting on the papilla and an undulating movement to eject the food bolus into the pharynx<sup>27,28</sup>. All these strategies were included in the protocol and applied in the therapeutic process.

The initial version was applied to 29 participants. During this stage, no adjustments were made to the protocol. The sessions required that participants have good quality access to the Internet and the platform previously agreed with the pathologist, be in a quiet place with good lighting, be seated in a chair with back support and feet on the floor, and have a bread roll (specifically, French bread, in Brazil), a banana, and a

glass of water, according to what was needed in each session.

The modifications suggested by the three experts were analyzed by the authors, who accepted all changes to the protocol format. Changes to the content were accepted when at least two of the participating professionals agreed, as listed below:

- Providing more details on how the general guidelines on pain education were carried out.
- Adding an item about posture during sleep and changing the term "sleep" to "sleep hygiene".
- Specifying the type of bread used.
- Standardizing the type of food, according to the International Dysphagia Diet Standardization Initiative – IDDSI<sup>33</sup>.
- Providing greater detail on the strategies used in swallowing and chewing training.
- Replacing nomenclatures with more appropriate terms.
- Explaining the use of the control board and training at home.
- Adding details on the guidance on correct chewing and swallowing patterns.
- Reorganizing the objectives and strategies.
- Adding the following to swallowing training: closed lips without perioral contraction, head posture without projection, and adequate suprahyoid muscle contraction.
- Adding the objectives and strategies for automating swallowing.
- Replace "plastic cup" with "transparent cup".

Thus, the final version of the protocol was defined with 14 patient care sessions. The first and last comprised the initial and final assessments, respectively, and the other 12 were orofacial myofunctional therapy sessions.

Chart 1 presents the structure and general objectives of the sessions. Charts 2 and 3 show details of the objectives, strategies, and proposed exercises.

Chart 1. Structure of the sessions

OROFACIAL MYOFUNCTIONAL SPEECH-LANGUAGE-HEARING THERAPY PROGRAM FOCUSING ON CHEWING AND SWALLOWING IN TEMPOROMANDIBULAR DISORDER	
1 <sup>st</sup> to 12 <sup>th</sup> WEEK	<p>General oral and written guidelines on pain education provided by the pathologist, using a slide presentation, videos, images, reading, and animations on the following topics:</p> <ul style="list-style-type: none"><li>• Information about TMD, orofacial pain, and possible etiological, behavioral, and emotional factors.</li><li>• Avoiding harmful habits such as biting nails and objects, chewing gum, and resting one’s hand on the jaw.</li><li>• Avoiding very hard and fibrous foods.</li><li>• Keeping one’s teeth open during the day.</li><li>• Maintaining jaw, head, and neck posture.</li><li>• Sleep hygiene: maintaining a regular sleep routine, keeping the temperature comfortable and the lighting in the room mild, avoiding screen use and alcohol or coffee before going to bed, and avoiding sleeping in positions that put pressure on the jaw or masticatory muscles.</li></ul>
1 <sup>st</sup> and 2 <sup>nd</sup> WEEKS	<ul style="list-style-type: none"><li>• Awareness and functional perception of chewing food.</li><li>• Perception of the patterns of speed, chewing side preference, number of cycles, perioral and mental muscle contractions, muscle strength, and amplitude of mandibular movements.</li></ul>
3 <sup>rd</sup> to 7 <sup>th</sup> WEEKS	<ul style="list-style-type: none"><li>• Targeted training to organize chewing food.</li><li>• Training the chewing pattern: speed, rhythm, preferred chewing side, number of cycles, perioral and mental muscle contraction, muscle strength, and amplitude of mandibular movements.</li></ul>
8 <sup>th</sup> to 12 <sup>th</sup> WEEKS	<ul style="list-style-type: none"><li>• Automating the new chewing pattern.</li><li>• Raising awareness and functional perception of swallowing saliva, food, and water, observing the aspects of mandibular stability and lip and tongue function.</li><li>• Directed training of the swallowing function, addressing mandibular stability, lip and tongue function, swallowing different foods with different consistencies, and swallowing saliva.</li><li>• Automating swallowing.</li></ul>

Caption: TMD = Temporomandibular disorder



**Chart 2.** Description of chewing procedures and strategies used in therapy

PROCEDURES: CHEWING		
Objective	Strategies (Foods to be used in training: banana and bread roll [Brazilian French bread])*	Frequency/Quantity
Promoting awareness and functional perception of chewing (Sessions 1 and 2)	<ul style="list-style-type: none"> <li>- Provide the patient with an oral explanation about aspects that they should observe in their chewing.</li> <li>- Then, in front of the screen/camera, ask them to monitor and perceive the speed (if they chewed too fast or too slow), side (if they chewed more on the right, left, or both), number of cycles (how many chewing cycles they performed), contractions of the perioral and mental muscles, muscle strength (if they applied too much force to the chewing muscles during chewing), and amplitude of mandibular movements (if they performed circular or vertical movements of the jaw and if these movements are wide or not) while chewing food.</li> <li>- Then, both the pathologist and the patient share their perceptions regarding their performance in the function.</li> <li>- During the week, the patient should observe these aspects in their usual diet in one meal per day and write down their perceptions on a control chart, which the pathologist will provide in the first session.</li> </ul>	<p>In therapy, practice with 3 portions of each food in a usual bite.</p> <p>At home, practice chewing during one meal of the day with the patient's usual foods.</p>
- Training the directed organization of chewing food. (Sessions 3 to 7)	<ul style="list-style-type: none"> <li>- In front of the screen, camera, or mirror, ask the patient to observe and adjust excessive contractions of the mentalis, orbicularis oris, and/or buccinator muscles and the masticatory force used when chewing.</li> <li>- In front of the screen, camera, or mirror, ask the patient to observe and adjust the chewing speed.</li> <li>- In front of the screen, camera, or mirror, ask the patient to observe and adjust the amplitude of the jaw movements when chewing.</li> <li>- In front of the screen, camera, or mirror, practice the alternating unilateral pattern: keeping the food on one side until the end of the portion. Switch sides for the next portion.</li> <li>- In front of the screen, camera, or mirror, practice the evolution of the masticatory pattern to the alternating bilateral pattern in the same portion. **</li> <li>- Over the weeks, the patient should observe these aspects in their usual diet in one meal per day, make adjustments, and note their perceptions on the control chart.</li> </ul> <p>**NOTE: Chewing training can be bilateral, alternating, or simultaneous, depending on the patient's condition. Alternating bilateral chewing should only be started when the patient has improved muscle pain, improved range of jaw movements and when there is no occlusal change leading to functional overload.</p>	
Automating chewing along with swallowing training (Sessions 8 to 12)	<ul style="list-style-type: none"> <li>- Train the evolution of chewing, maintaining the adequacy of the aspects worked on previously while adjusting swallowing.</li> </ul>	

\*The consistencies were standardized according to the International Dysphagia Diet Standardization Initiative – IDDSI24: level 7, easy to chew (banana); level 7, normal (bread); and level 0 (water).

**Chart 3.** Description of swallowing procedures and strategies used in therapy

PROCEDURES: SWALLOWING		
Objective	Strategies	Frequency/ Quantity
Raising awareness and functional perception of swallowing (Session 8)	<ul style="list-style-type: none"> <li>- Oral explanation to the patient about the aspects that should be observed in their swallowing.</li> <li>- Then, in front of the screen, camera, or mirror, ask them to monitor and perceive their swallowing, observing the following: jaw stability, lip sealing, head posture, tongue movements, and suprahyoid muscle contraction.</li> <li>- Then, both the pathologist and the patient share their perceptions of their performance in the function.</li> <li>- During the week, the patient should observe these aspects in their usual diet in one meal per day and write down their perceptions in the control chart.</li> </ul>	<p>In therapy, practice swallowing saliva 5 times. At home, observe swallowing saliva 5 times, 3 times a day.</p>
Training the directed organization of swallowing saliva and different foods with different consistencies. (Sessions 9 to 11)	<ul style="list-style-type: none"> <li>- <b>Saliva:</b> in front of the screen, camera, or mirror, request adjustment of the tongue positioning on the palate, mandibular stability, and lip function during swallowing.</li> <li>- <b>Liquid (water):</b> in front of the screen, camera, or mirror, ask the patient to adjust the directed swallowing; ask the patient to take a sip of water in their mouth and keep the lips closed (without tension), the jaw stable (without head projection), with tongue elevation movement against the palate and adequate suprahyoid muscle contraction. Then, perform the usual swallowing sequentially, adjusting the same aspects.</li> <li>- <b>Solid foods (banana and bread):</b> in front of the screen, camera, or mirror, request adjustment of the following aspects: maintenance of mandibular stability, lips occluded without tension, without head projection, with movements of raising the tongue against the palate and adequate contraction of the suprahyoid muscles.</li> <li>- During the week, the patient should observe these aspects in their usual diet in one meal a day and note their perceptions in the control chart.</li> </ul>	<p>In therapy, practice with a 200 ml transparent cup. At home, practice with a glass of water 3 times a day.</p> <p>In therapy, practice with 3 portions of each food in a usual bite.</p> <p>At home, practice should be done during one meal per day, with the patient's usual foods.</p>
Automatizing swallowing (Session 12)	<ul style="list-style-type: none"> <li>- Train the evolution of the swallowing pattern with solid foods and water, maintaining the adequacy of the aspects worked on previously.</li> </ul>	

The consistencies were standardized according to the International Dysphagia Diet Standardization Initiative – IDDSI<sup>24</sup>: level 7, easy to chew (banana); level 7, normal (bread), and level 0 (water).

## DISCUSSION

SLH therapy in cases of TMD aims to restore the stomatognathic system's functioning, balance orofacial functions, and reduce limitations, pain, and discomfort<sup>12</sup>. This study aimed to develop an orofacial myofunctional therapy program focusing on chewing and swallowing functions to guide professionals during SLH teletherapy treatment and interventions for patients with TMD.

The Brazilian Ministry of Health recommends using therapeutic protocols<sup>34</sup>, which aim to ensure the best care and assistance. Protocols are instruments that offer the best treatment options available, built within the principles of evidence-based practice<sup>34,35</sup>. Their use improves care, favors scientifically based practices, reduces the variability of information and conduct, and establishes limits for action and cooperation among the various professionals<sup>34</sup>.

The experts' evaluation of protocols is an important step in the development of evaluation instruments<sup>36,37</sup>. Thus, in the third stage, three experts with more than 10 years of experience in the area analyzed the protocol, as seen in a similar study<sup>22</sup>.

The mapping of the literature and the training strategies found by searching the databases show that such strategies do not follow a defined treatment protocol. Also, no publications were found that exclusively address stomatognathic function training in these cases. Most studies used myofunctional therapy in combination with other resources<sup>27,28,31,32,38</sup>, making it difficult to analyze the impact of functional therapy alone. Investigating effective functional strategies is important in TMD cases, in which the main objective of SLH therapy is to rehabilitate functions. Since the literature is scarce on this topic, it is suggested that other studies with standardized methodologies be carried out.

Regarding chewing rehabilitation, the literature presents alternating unilateral chewing training to stimulate rotary mandibular movement<sup>27</sup>. Simultaneous bilateral chewing training was performed to avoid condylar translation and balance the masticatory load<sup>20,28,31</sup>. Alternating bilateral chewing training, in turn, was indicated only when the patient had developed better muscular conditions<sup>18,20,28,31,32</sup>.

As for swallowing function, patients were asked to increase their chewing time to reduce food into smaller particles and better lubricate the food bolus<sup>28,31</sup>. Swallowing training was also suggested, with the tongue raised on the papilla, followed by a wave-like

movement to improve the propulsion of the food bolus to the pharynx<sup>27,28</sup>. It was also emphasized that patients need to be instructed on how to self-monitor their swallowing until the first reassessment.

The therapeutic program presented here was used in a scientific study. Its objectives and strategies were standardized for all participants to maintain methodological rigor. However, in clinical practice, each patient's characteristics and particularities must always be considered for better therapeutic progress. In cases of TMD, each patient's type of dysfunction, its causal factors, and bone and muscle characteristics must also be considered. This highlights the need for the pathologist to prioritize individual approaches; hence, the therapeutic program presented here is merely a set of foundations and a guide for professionals in myofunctional work with this population. The main challenge during teletherapy sessions was standardizing the food since the texture and consistency of the bread and banana could change from one week to another. Furthermore, an unstable internet connection was also a challenging factor at times.

It is important to note that this protocol was created for SLH teletherapy sessions. Applying it in in-person therapy requires adaptations and a new study to confirm its applicability in this scenario. This study must be continued to confirm the total validity of the instrument (content, criterion, and construct validity)<sup>39</sup> and demonstrate the post-therapy results of individuals who received treatment based on this therapeutic program.

## CONCLUSION

The Orofacial Myofunctional SLH Teletherapy Program focusing on chewing and swallowing in TMD was created, adjusted, and here presented to assist and guide professionals in myofunctional work with this population. Further research is greatly important to validate this instrument.

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#### Author contributions:

MAS: Conceptualization; Data curation; Data analysis; Investigation; Methodology; Project administration; Resources; Software; Validation; Visualization; Writing - Original draft; Writing - Review & editing.

RMMMF, CMAL, ARM: Conceptualization; Data analysis; Funding acquisition; Supervision; Visualization; Writing - Review & editing.

#### Data sharing statement:

Individual participant data will not be shared, as other studies are still being conducted with them. Additional documents (the study protocol and consent form) will be made available immediately after publication, with no time limit, to anyone who wishes to access them and for any purpose. Requests should be sent to the email [marianaamaralfono@gmail.com](mailto:marianaamaralfono@gmail.com)