

Case Report

Relato de Caso

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Effect of speech-language therapy after low-level laser therapy in patients with TMD: a descriptive study

Efeito do tratamento fonoaudiológico após a laserterapia de baixa intensidade em pacientes com DTM: estudo descritivo

ABSTRACT

Increased pain and/or discomfort during chewing, speaking, and swallowing have been commonly reported by patients with Temporomandibular Dysfunction (TMD). Speech-language pathology therapy (orofacial myofunctional therapy - OMT) has been proposed as part of the treatment for this condition; however, it is a modality that should be introduced when the TMD context and the pain are not accentuated, so that they do not prevent or hinder the performance of exercises. **Purpose:** The aim of this study was to analyze the effect of OMT on the treatment of patients with TMD, according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), after analgesia with low-level laser therapy (LLLT), regarding orofacial myofunctional conditions (OMC) and the perception of TMD symptoms. **Methods:** Five patients aged 50 to 61 years were evaluated 30 days after completion of LLLT. An experienced speech-language pathologist conducted, pre- and post-OMT, the application of the ProDTM Multi-questionnaire - to investigate the self-perception of TMD symptomatology, and the Orofacial Myofunctional Evaluation with Scores (OMES) clinical examination - to confirm the orofacial myofunctional conditions. **Results:** OMC presented increased OMT scores, indicating an increase in myofunctional orofacial balance. According to the patients' perception, TMD signs and symptoms were relieved after the application of OMT. **Conclusion:** According to the self-perception of the treated patients, introduction of OMT after LLLT analgesia promoted a balance of the orofacial functions of the sample studied, as well as a decrease in the remaining TMD signs and symptoms.

RESUMO

O aumento da dor/desconforto durante atividades como mastigar, falar e deglutir é comumente relatado por pacientes com Disfunção Temporomandibular (DTM) e a terapia fonoaudiológica miofuncional orofacial (TMO) tem sido proposta como parte do tratamento desta condição. Porém é uma modalidade que deve ser instituída quando o quadro de DTM e dor não está exacerbado a fim de não impedir ou dificultar a realização dos exercícios. **Objetivo:** O objetivo deste estudo foi analisar o efeito da TMO no tratamento de pacientes com DTM, segundo o Research Diagnostic Criteria for temporomandibular disorders (RDC/TMD), após analgesia com laserterapia de baixa intensidade (LBI), quanto às condições miofuncionais orofaciais (CMO) e quanto à percepção dos sintomas de DTM. **Método:** Transcorridos 30 dias após a finalização da LBI, cinco pacientes foram avaliados, com idades entre 50 e 61 anos. A aplicação do questionário ProDTMMulti para investigação da autopercepção da sintomatologia de DTM e do exame clínico AMIOFE (Avaliação Miofuncional Orofacial com Escores) para constatação das condições miofuncionais orofaciais foram realizados por fonoaudióloga experiente, antes e após a TMO. **Resultados:** As CMO apresentaram aumento dos escores após TMO, indicando aumento do equilíbrio miofuncional orofacial. De acordo com a percepção das pacientes, após a TMO houve alívio dos sinais e sintomas de DTM. **Conclusão:** A TMO instituída após a analgesia com LBI promoveu equilíbrio das funções orofaciais da amostra estudada e diminuição dos sinais e sintomas de DTM remanescentes, de acordo com a autopercepção dos indivíduos tratados.

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Keywords

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Descritores

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INTRODUCTION

The temporomandibular disorders (TMD) cover a set of changes related to the stomatognathic system, involving temporomandibular joints, the masticatory muscles and associated structures, and the presence of pain in these structures is the most frequent symptom^(1,2). In addition, as a characteristic in pain contexts from the musculoskeletal system, the increased pain/discomfort during activities such as chewing, speaking and swallowing is commonly reported by TMD patients⁽²⁻⁵⁾, which may be unbalanced, characterizing a secondary orofacial myofunctional disorder (OMD). On the other hand, it is possible that such functional unbalances contribute as a coadjuvant in the hastiness or maintenance of TMD, and are characterized as risk factors or contributors to TMD^(5,6).

Considering these aspects, the orofacial myofunctional therapy (OMT) has been proposed as part of the treatment of patients with TMD, in order to promote orofacial myofunctional balance^(7,8) and thus minimize the contributing factors related to the functional conditions of the stomatognathic system. The OMT proposes exercises, with the objective of increasing the precision and coordination of isolated movements of the orofacial structures, such as lips, tongue, jaw and cheeks, as well as balancing the stomatognathic functions, consistent with dental occlusion and with the temporomandibular joints (TMJ), and without exacerbating the pre-existing problem^(7,8). However, it is a modality that presents good results when the TMD and pain contexts are not in the acute phase, as such exercise may intensify them at this stage. Thus, interventions that act directly on analgesia mechanisms, such as the low level laser therapy (LLLT), favor the speech therapy at another time, when it is already possible for the patient to perform the exercises without causing pain, increasing the functional stability of the stomatognathic system⁽⁶⁾.

The use of LLLT in musculoskeletal pain conditions has been described and discussed in recent studies, demonstrating favourable results in myogenic and articular pain, as it induces an analgesic, anti-inflammatory and biomodulator effect on cellular physiological functions^(9,10). It is a non-pharmaceutical, non-invasive, rapid and safe intervention, that may be beneficial for TMD patients⁽¹¹⁾. In a previous study⁽¹²⁾, the LLLT did not have a lasting effect in remission of the painful condition, in which there was a recurrence after one month from the end of treatment; also, it did not present an effect on orofacial myofunctional conditions (OMC), suggesting that a specific intervention would be necessary, such as OMT, in cases in which the change was considered to be a coadjuvant factor of the existing TMD. In these cases, in the Occlusion, TMD and Orofacial Pain Service of this faculty, the patients are referred by the dental surgeons responsible to the routine evaluation and speech therapy. Thus, the speech therapy service of the occlusion, TMD and orofacial pain area receives the referrals and requests for opinions and procedures from dental surgeons (professors, employees and undergraduate and postgraduate students), who act directly with this patient demand in the dental clinic.

Thus, the objective of this study was to analyze the effect of orofacial myofunctional therapy in the treatment of patients with TMD, referred to speech therapy after analgesia with low level laser therapy, concerning to the orofacial myofunctional conditions and the perception of TMD symptoms. The hypothesis is that this therapeutic modality improves a balance in the orofacial myofunctional conditions not only achieved with analgesia, but the reduction of the remaining symptomatology, even after analgesia with laser therapy, as a side effect.

METHODS

Presentation of clinical cases

Five female patients, with muscular TMD, associated to the articular TMD, In accordance with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD)⁽¹⁾, were referred for evaluation and speech therapy, 30 days after completing LLLT treatment, for orofacial myofunctional changes related to the condition. This waiting time was foreseen in the research project, in which the patients participated, and the evaluation of the effect duration of the proposed treatment showed a recurrence of pain⁽¹²⁾. The ages ranged from 50 to 61 years (mean: 55.2 years). The project that led to the study of the cases was approved by the Ethics Committee in Research with Human Beings, and the Free and Informed Consent Form was signed by the patients (CAAE: 0011.0.138.000-07).

Speech therapy assessment

The Speech Therapy assessment included the application of the ProDTMMulti questionnaire (Protocol for multi-professional centers for the determination of signs and symptoms of temporomandibular disorders) to investigate the self-perception of TMD symptomatology⁽¹³⁾, and the OMES (Orofacial Myofunctional Evaluation with Scores) clinical examination, to verify the orofacial myofunctional conditions⁽¹⁴⁾. Both were conducted by an experienced speech therapist, before (A1) and after the speech therapy (A2).

The ProDTMMulti questionnaire was developed and validated for use in multiprofessional centers and consists of two parts. Part I contains questions with possibilities for affirmative and negative answers. Part II consists of four everyday situations: "upon awakening," "when chewing," "when speaking," and "at rest." In each situation, ten symptoms are investigated, for which the patient must assign a score between 0 to 10, the higher the more intense the perceived sensation. Thus, the perception of the severity of the signs and symptoms investigated through the ProDTMMulti protocol was established by the sum of the scores attributed in the four daily situations mentioned above. Results from 1 to 10 indicate severity degree 1 or mild; from 11 to 20, degree 2 or moderate; from 21 to 30, degree 3 or severe; 31 to 40, degree 4 or very severe.

OMES is a validated protocol for adults⁽¹⁴⁾, with scores assigned by the speech therapy evaluator, divided into 3 main items: 1 - Appearance/Posture; 2 - Mobility of orofacial structures; 3 - Functions of the stomatognathic system of breathing,

swallowing and chewing. The evaluation was conducted by visual observation during the patient care and complemented by filming analysis, recorded by a video camera (Panasonic 9000) supported on a tripod and always positioned at the same distance from the chair used by the patients.

Speech therapy

The total number of sessions varied from 10 to 13, with 1 session per week and with duration of 50 minutes each one. The speech therapy protocol, specifically denominated in these cases as orofacial myofunctional therapy (OMT), was established in such a way that the individually proposed goals (in each case) could gradually progress, within a program of rehabilitation of the orofacial functions. In our service, which attends the demand of TMD patients, we have been working with a hierarchy of therapeutic goals, in order to achieve a balance of stomatognathic functions, consistently with the occlusal morphology and the TMJs, that is the major objective of OMT. Thus, the protocol for all patients consisted of three stages: First stage: Relief of painful symptoms, awareness of the harmful oral habits and self-handling strategies; Second stage: myotherapy, consisting of exercises for specific muscle groups, with the purpose of increasing the flexibility, coordination and symmetry of movements and stabilizing TMJ function; Third stage: OMT, for the balance of the stomatognathic functions (chewing, speech, swallowing, breathing and rest). The conducts, established for each stage, varied from patient to patient, according to individual rehabilitation needs^(7,8). It is important to observe that the stages, as well as the sessions, did not occur in a separately, but rather with an interdependence relationship among them, constructing a continuous therapeutic process of learning for the patient. Therefore, its division into three parts presented the didactic purpose of guiding and optimizing the evolution of the speech therapy treatment, as well as facilitating the patient's adherence to the treatment, since it is believed that, in this way, the different times of the therapy can be seen, along with the respective treatment end.

Data analysis

Due to the fact that it was a reduced sample, the findings were compared and analyzed in a descriptive way, that is, in respect to the mean, standard deviation, median and minimum and maximum values.

RESULTS

The mean, median, standard deviation and minimum and maximum values found for the sample are described in Table 1. We can observe that, after OMT, the symptomatology passed from degree 2 (moderate) to degree 1 (mild) or to zero (absent).

The changed orofacial myofunctional conditions presented increased scores after therapeutic intervention, mainly for the items of mobility of the orofacial structures and functions, indicating an increase in the orofacial myofunctional balance, after speech therapy treatment (Tables 2, 3, 4 and 5, and Figure 1).

Table 1. Descriptive analysis of the scores assigned to the signs and symptoms investigated, according to the ProDTMMulti, before and after the orofacial myofunctional therapy (OMT). Mean; Median (Standard Deviation, Minimum, Maximum)

SIGNS AND SYMPTOMS	BEFORE OTM	AFTER OTM
MUSCLE PAIN	14; 15(4.53, 9, 20)	5.8; 6(5.11, 0, 13)
TMJ PAIN	11.8; 12(4.99, 5, 17)	5; 3(5.47, 0, 14)
NECK PAIN	12.6; 6(15.9, 0, 40)	3.4; 3(2.61, 0, 6)
EARACHE	3.2; 0(5.63, 0, 13)	0; 0(0, 0, 0)
TINNITUS	6.4; 0(8.87, 0, 18)	0; 0(0, 0, 0)
AURAL FULLNESS	7.2; 4(8.32, 0, 18)	0.4; 0(0.89, 0, 2)
TEETH SENSIBILITY	5.6; 0(8.76, 0, 20)	0.4; 0(0.89, 0, 2)
TMJ NOISE	3.4; 0(7.6, 0, 17)	0.4; 0(0.89, 0, 2)
DIFFICULTY TO SWALLOWING	1.6; 0(3.57, 0, 8)	0.6; 0(1.34, 0, 3)
DIFFICULTY TO SPEAK	2.2; 0(4.92, 0, 11)	0; 0(0, 0, 0)

Table 2. OMES - Aspect/Posture of orofacial structures before and after orofacial myofunctional therapy (OMT). Descriptive data of the scores assigned to each structure evaluated. Mean; Median (Standard Deviation, Minimum, Maximum)

STRUCTURE EVALUATED	BEFORE OTM	AFTER OTM
LIPS	2.2; 2(0.45, 2, 3)	2.2; 2(0.45, 2, 3)
JAW	2.2; 2(0.45, 2, 3)	2.2; 2(0.45, 2, 3)
CHEEKS	1.8; 2(0.45, 1, 2)	1.8; 2(0.45, 1, 2)
SIMMETRY FACE	2; 2(0, 2, 2)	2; 2(0, 2, 2)
TONGUE	2; 2(0, 2, 2)	2.6; 3(0.55, 2, 3)
HARD PALATE	2.8; 3(0.45, 2, 3)	2.8; 3(0.45, 2, 3)
TOTAL	13; 13(0.71, 12, 14)	13.6; 13(1.52, 12, 16)

Caption: Maximum values accepted by protocol, indicating standard of normality for each structure evaluated: Lips = 3; Jaw = 3; Cheeks = 3; Symmetry face = 3; Tongue = 3; Hard palate = 3 (Total of the aspect/posture item: 18)

Table 3. OMES - Mobility of orofacial structures before and after orofacial myofunctional therapy (OMT). Descriptive data of the scores assigned to each structure evaluated. Mean; Median (Standard Deviation, Minimum, Maximum)

STRUCTURE EVALUATED	BEFORE OTM	AFTER OTM
LIPS	9.4; 10(0.89, 8, 10)	10.8; 10(1.09, 10, 12)
TONGUE	12.8; 13(0.84, 12, 14)	16.8; 18(2.17, 13, 18)
JAW	12; 13(2.65, 8, 15)	13.4; 14(1.52, 11, 15)
CHEEKS	10.2; 11(1.64, 8, 12)	11.6; 12(0.55, 11, 12)
TOTAL	44.4; 44(2.96, 41, 49)	52.6; 53(3.65, 48, 57)

Caption: Maximum values allowed by the protocol indicating standard of normality for each structure evaluated: Lips = 12; Tongue = 18; Jaw = 15; Cheeks = 12 (Total of the mobility item: 57)

Table 4. OMES - Functions of breathing, swallowing and mastication before and after orofacial myofunctional therapy (OMT). Descriptive data of the scores assigned to each function evaluated. Mean; Median (Standard Deviation, Minimum, Maximum)

FUNCTION EVALUATED	BEFORE OTM	AFTER OTM
BREATHING	2.4; 2(0.55, 2, 3)	3; 3(0, 3, 3)
SWALLOWING	12; 12(1.41, 10, 14)	13.6; 13(1.34, 12, 15)
MASTICATION	7; 7(0.71, 6, 8)	9; 9(0.71, 8, 10)
TOTAL	21.4; 22(1.95, 19, 24)	25.6; 25(1.95, 23, 28)

Caption: Maximum values accepted by protocol indicating standard of normality to each structure evaluated: Breathing = 3; Swallowing = 15; Chewing = 10. (Total of the functions item: 28)

The TMD diagnosis of each patient, according to the RDC/TMD(1), is described in Table 5.

DISCUSSION

The TMD context is characterized by a combination of signs and symptoms involving the orofacial region, of which pain is the main motivator for seeking appropriate treatment⁽²⁾, and its relief is the first goal to be established. In a previous study⁽¹²⁾, the degree of analgesia reached by LLLT was not permanent for all patients after 30 days, and it did not modify the OMC, which could be acting as the TMD perpetuating factors. In this study, the patients under these conditions were submitted to speech therapy, that is, the OMT was necessary after LLLT treatment, whose remaining analgesia favored the practice of orofacial myofunctional exercises. Moreover, we could observe that the perception of painful symptoms, investigated by ProDTMMulti, also changed after OMT, and these symptoms were evaluated as less intense at this time (from moderate to mild or absent - Table 1). This suggests that the stability of the orofacial functions, achieved by OMT, is also shown in the reduction of the perceived symptomatology, contributing to the remission of TMD condition, as a perpetuating factor, and to the general stability of the stomatognathic system.

Additionally, to the painful symptoms in musculature, in TMJ, ears and neck, other signs and symptoms concerning

to orofacial functions and ears, the patients' perception also showed a decrease in the symptoms after the OMT, according to the and investigated by ProDTMMulti. Similar results were found in previous studies, and this protocol was validated for this purpose⁽¹³⁾. These results enhance the importance of speech therapist participation in the multidisciplinary treatment of TMD and Orofacial Pain, since the patients were able to perceive the beneficial changes achieved, which contributes to personal satisfaction and increased quality of life.

In order to better understand the actual changes related to OMC obtained through OMT, these conditions were measured by a perceptive evaluation, based on the OMES protocol, validated for this purpose⁽¹⁴⁾. According to the American Association of Dental Research⁽¹⁵⁾, the TMD signs and symptoms are frequently associated to masticatory, speech, and other orofacial difficulties, which are part of the speech therapy in the field of orofacial motricity. These difficulties, when diagnosed as an orofacial myofunctional disorder, are changes that may generate functional overload to the stomatognathic system, and may act as risk factors for TMD⁽⁴⁻⁶⁾. In this study, OMT showed an increase of OMES scores after 13 sessions, which represents more effective and stable orofacial neuromuscular functions, reducing the TMD risk.

Specifically, in the concerns for the "Aspect/Posture" item, few changes were observed. One hypothesis for this aspect is that these are structures whose modifications are sensitive and perceived only with visual evaluation, or do not even occur, as in the case of the "palate", the "face symmetry" and "cheeks", and do not visibly reflect the functional improvement obtained.

For the orofacial mobility, exercises guided to lips, tongue, cheeks and masticatory muscles, as well as TMJ, were established with the objective of increasing flexibility, coordination of movements and muscular strength to optimize stomatognathic functions and stabilize the TMJ. At the completion of the treatment, there was an increase in the mean of the scores for all the evaluated items. Achieving these goals means promoting conditions considered as prerequisites for the good performance of the stomatognathic functions, since they facilitate the training and the installation of more balanced and stable functional patterns^(7,8), which favored the diagnosis of the TMDs found.

The stomatognathic functions were healed in therapy through strategies that aimed at using the functions for exercise and training. In this case, food was used for mastication training, in order to coordinate the masticatory cycle pattern and minimize pain and

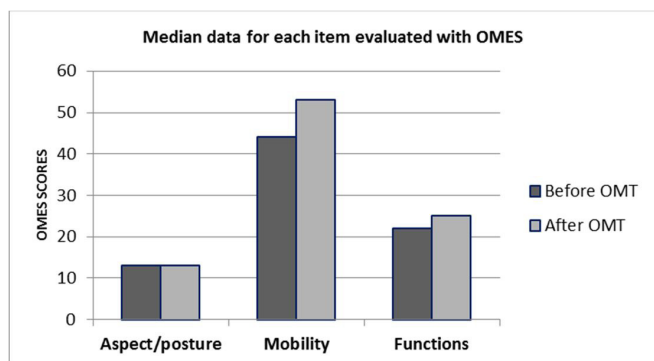


Figure 1. OMES - Aspect/Posture, Mobility of orofacial structures and functions of breathing, swallowing and mastication before and after orofacial myofunctional therapy (OMT), median data. Maximum values of the score allowed by the protocol for each item, indicating ideal standard for all structures and functions investigated: Aspect/posture (18); Mobility (57); Functions (28)

Table 5. TMD diagnosis (RDC/TMD) and OMES - Scores found for Breathing, Swallowing and Chewing functions in each patient, before and after orofacial myofunctional therapy (OMT). The sum of the scores of the three functions gives a total score for the "Functions" item

PATIENTS	RDC/TMD	BREATHING		SWALLOWING		MASTICATION		Total	
		Before OMT	After OMT	Before OMT	After OMT	Before OMT	After OMT	Before OMT	After OMT
J.G	Ia + IIa	3	3	12	13	7	9	22	25
M.A.C	Ib + IIIa	3	3	14	15	7	10	24	28
I.M.P	Ib + IIa + IIIa	2	3	10	13	7	9	19	25
M.H.G.C	Ib + IIIa	2	3	12	12	6	8	20	23
M.A.F	Ia + IIIa	2	3	12	15	8	9	22	27

Caption: Ia = Myofascial pain without limitation of mouth opening; Ib = Myofascial pain with limitation of mouth opening; IIa = joint disc displacement with reduction; IIIa = arthralgia

joint noises (in cases of arthralgia and disc displacement with reduction, respectively), and also for the training of swallowing, to be executed without effort and without pain. Breathing was trained to be executed in a costodiaphragmatic and nasal way. After OMT, there was an increase in the individual and average scores for this item, culminating with the major objective of this treatment modality, which is the orofacial myofunctional balance appropriate to the facial, articular and occlusal morphology, to be established without pain and without enhancing the problem^(7,8).

These results showed that the stability and coordination of these functions in the presented cases reflected positively in the TMD context, either by the articular or muscular conditions. In this aspect, the orofacial and myofunctional therapy is part of what is currently proposed for the TMD treatment, since it is a non-invasive therapy and promotes self-knowledge and self-handling of orofacial conditions, including TMD signs and symptoms^(2,15).

The result description of only five patients leads to the limitation to generalize the results to other TMD populations, and studies with larger samples and with randomized, controlled, double-blind features in future studies are important to prove the OMT effectiveness, as a contribution in TMD treatment. However, within the limits of this study, the descriptive analysis of the results of orofacial myofunctional therapy allowed us to know the speech therapy contribution in the TMD treatment, whose main objective is the functional balance of the stomatognathic system^(7,8), but it also reflected the symptomatology decrease, according to the self-perception of the treated patients. Such a therapeutic contribution is favourably conducted when the patient is not in an acute pain situation, and the LLLT is an appropriate and prior analgesia treatment, as occurred in the five cases studied. It is important to highlight that the wait of 30 days after the end of the laser therapy occurred exclusively due to the research protocol, in which the patients participated and it is not a criterion for indication of OMT beginning, which must be established as soon as there is sufficient analgesia.

FINAL COMMENTS

The orofacial myofunctional therapy, established after analgesia with low level laser therapy, led to a balance of the orofacial functions of the studied sample, and to a decrease in the remaining TMD signs and symptoms, according to the self-perception of the treated patients. It is believed that the indication of clinical procedures that aim at analgesia prior to OMT also corroborate similar results.

REFERENCES

1. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique. *J Craniomandib Disord*. 1992;6(4):301-55. PMID:1298767.
2. De Rossi SS, Greenberg MS, Liu F, Steinkeler A. Temporomandibular disorders: evaluation and management. *Med Clin North Am*. 2014;98(6):1353-84. PMID:25443680. <http://dx.doi.org/10.1016/j.mcna.2014.08.009>.
3. Bakke M, Hansdóttir R. Mandibular function in patients with temporomandibular joint pain: a 3-year follow-up. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;106(2):227-34. PMID:18547838. <http://dx.doi.org/10.1016/j.tripleo.2007.12.034>.
4. Ferreira CL, Silva MA, Felício CM. Orofacial myofunctional disorder in subjects with temporomandibular disorder. *Cranio*. 2009;27(4):268-74. PMID:19891261. <http://dx.doi.org/10.1179/crn.2009.038>.
5. Ferreira CL, Machado BC, Borges CG, Silva MAR, Sforza C, Felício CM. Impaired orofacial motor functions on chronic temporomandibular disorders. *J Electromyogr Kinesiol*. 2014;24(4):565-71. PMID:24816190. <http://dx.doi.org/10.1016/j.jelekin.2014.04.005>.
6. Douglas CR, Avoglio JL, de Oliveira H. Stomatognathic adaptive motor syndrome is the correct diagnosis for temporomandibular disorders. *Med Hypotheses*. 2010;74(4):710-8. PMID:19910127. <http://dx.doi.org/10.1016/j.mehy.2009.10.028>.
7. Felício CM, Melchior MO, Ferreira CL, Silva MA. Otologic symptoms of temporomandibular disorder and effect of orofacial myofunctional therapy. *Cranio*. 2008;26(2):118-25. PMID:18468271. <http://dx.doi.org/10.1179/crn.2008.016>.
8. Felício CM, Melchior MO, Silva MA. Effects of orofacial myofunctional therapy on temporomandibular disorders. *Cranio*. 2010;28(4):249-59. PMID:21032979. <http://dx.doi.org/10.1179/crn.2010.033>.
9. Cetiner S, Kahraman SA, Yücetaş S. Evaluation of low-level laser therapy in the treatment of temporomandibular disorders. *Photomed Laser Surg*. 2006;24(5):637-41. PMID:17069496. <http://dx.doi.org/10.1089/pho.2006.24.637>.
10. Herpich CM, Amaral AP, Leal-Junior EC, Tosato JP, Gomes CA, Arruda ÉE, et al. Analysis of laser therapy and assessment methods in the rehabilitation of temporomandibular disorder: a systematic review of the literature. *J Phys Ther Sci*. 2015;27(1):295-301. PMID:25642095. <http://dx.doi.org/10.1589/jpts.27.295>.
11. Emshoff R, Bösch R, Pümpel E, Schöning H, Strobl H. Low-level laser therapy for treatment of temporomandibular joint pain: a double-blind and placebo-controlled trial. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;105(4):452-6. PMID:18329580. <http://dx.doi.org/10.1016/j.tripleo.2007.09.012>.
12. Melchior MO, Venezian GC, Machado BC, Borges RF, Mazzetto MO. Does low intensity laser therapy reduce pain and change orofacial myofunctional conditions? *Cranio*. 2013;31(2):133-9. PMID:23795403. <http://dx.doi.org/10.1179/crn.2013.021>.
13. Felício CM, Melchior MO, Silva MA. Clinical validity of the protocol for multi-professional centers for the determination of signs and symptoms of temporomandibular disorders. Part II. *Cranio*. 2009;27(1):62-7. PMID:19241801. <http://dx.doi.org/10.1179/crn.2009.010>.
14. Felício CM, Medeiros AP, Melchior MO. Validity of the 'protocol of orofacial myofunctional evaluation with scores' for young and adult subjects. *J Oral Rehabil*. 2012;39(10):744-53. PMID:22852833. <http://dx.doi.org/10.1111/j.1365-2842.2012.02336.x>.
15. Greene CS, Klasser GD, Epstein JB. Revision of the American Association of Dental Research's science information statement about temporomandibular disorders. *J Can Dent Assoc*. 2010;76:a115. PMID:20943030.

Author contributions

MOM participated in the care orientation and supervision, as well as in the structure and writing of the manuscript; BCZM participated in the clinic and therapeutic care and in the review of the manuscript; LVM participated in the statistics and in the discussion of the results; MOM participated in providing infrastructure, in the literature review and as a general supervisor of the study.