

Physiotherapeutic treatment in temporomandibular disorders

Tratamento fisioterapêutico nas desordens temporomandibulares

Marcelo Pelicioli¹, Rafaela Simon Myra¹, Vivian Carla Florianovicz¹, Juliana Secchi Batista²

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ABSTRACT

BACKGROUND AND OBJECTIVES: Temporomandibular dysfunction is defined as a set of dysfunctions that affect the masticatory muscles, the temporomandibular joint and associated structures. The objective of this study was to systematize scientific evidence on the techniques of physiotherapeutic treatment for temporomandibular disorders.

CONTENTS: The search was performed on the Medline, LILACS and Scielo databases, as well as the Pubmed search tool for articles published in the last 10 years, from August 2006 to August 2016. The survey was carried out with the following descriptors: “temporomandibular joint” and “physiotherapy”, “temporomandibular joint disorders” and “physiotherapy”, “temporomandibular joint” and “physiotherapy techniques”, “temporomandibular joint disorders” and “physiotherapy techniques”. We included randomized trials and case reports, composed only of patients with temporomandibular disorders who underwent physical therapy. The search totaled 32 studies and 11 of them were selected. The pain was assessed by unanimity. The articles did the same amount of sessions.

CONCLUSION: Several resources such as ultrasound, laser, cathodic current; or manual therapies, as muscle stretching, and joint mobilization bring remarkable benefits to temporomandibular dysfunction. However, studies with higher methodological quality with follow-up are necessary.

Keywords: Physiotherapy, Temporomandibular dysfunction, Temporomandibular joint, Temporomandibular joint disorders.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A disfunção temporomandibular é definida como um conjunto de disfunções que acometem os músculos mastigatórios, a articulação temporomandibular e estruturas associadas. O objetivo deste estudo foi sistematizar evidências científicas sobre técnicas de tratamento fisioterapêutico para as desordens temporomandibulares.

CONTEÚDO: A busca foi realizada a partir da consulta às bases de dados Medline, LILACS e Scielo, além da ferramenta de busca Pubmed dos artigos publicados nos últimos 10 anos, de agosto 2006 à agosto de 2016. O levantamento foi realizado com os seguintes descritores: “articulação temporomandibular” e “fisioterapia”, “transtornos da articulação temporomandibular” e “fisioterapia”, “temporomandibular joint” and “physiotherapy techniques”, “temporomandibular joint disorders” and “physiotherapy techniques”. Foram incluídos ensaios randomizados e relatos de casos, compostos apenas por pacientes com desordens temporomandibulares que realizaram tratamento fisioterapêutico. A busca totalizou 32 estudos e destes, foram selecionados 11 artigos. A dor foi avaliada por unanimidade. Os artigos realizaram a mesma quantidade de sessões.

CONCLUSÃO: Diversos recursos como o ultrassom, laser, corrente catódica, ou ainda, terapias manuais como alongamento muscular e mobilização articular trazem benefícios notáveis na dor da disfunção temporomandibular. Porém, estudos com maior qualidade metodológica com *follow-up* são necessários

Descritores: Articulação temporomandibular, Disfunção temporomandibular, Fisioterapia, Transtornos da articulação temporomandibular.

INTRODUCTION

Temporomandibular joint (TMJ) is considered the most complex structure of the human body. TMJ performs rotational and translational movements due to the double articulation of the temporal bone condyle. The fact that TMJ presents two joints (condyles) connected to the mandible requires that they work synchronously between dental occlusion, neuromuscular balance and the joint itself. This joint is vulnerable to functional or pathological alterations, leading to disorders such as temporomandibular disorder (TMD)¹.

TMD is defined as a set of disorders involving masticatory muscles, TMJ, and adjacent segments. These disturbances affect the dynamic balance of the structures, leading to a series of signs and symptoms typical of this dysfunction. Face pains, TMJ and/or masticatory muscles and headache are the main ones. Other less frequent symptoms that may be present are manifestations

1. Universidade do Estado Santa Catarina, Faculdade de Fisioterapia, Florianópolis, SC, Brasil.
2. Universidade de Passo Fundo, Disciplina de Fisioterapia, Carazinho, RS, Brasil.

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Correspondence to:

BR Km 292, Av. Brasil Leste, 285 - São José
99052-900 Passo Fundo, RS, Brasil.
E-mail: rafaelasimonmyra@gmail.com

of tinnitus and vertigo. Regarding the signs, there is primarily muscle and TMJ sensitivity to palpation, limitation and/or disturbances of mandibular movement and joint noises. It is estimated that 40 to 75% of the population has at least one TMD signal, such as noise, and at least one symptom, such as facial pain or TMJ (33%)².

TMD affects a large part of the world's population. Due to this fact, it is essential to develop therapeutic techniques for its treatment. Physiotherapy contributes to lessening the TMD symptoms, as it stimulates proprioception, production of synovial fluid in the joint, improves the elasticity of adhered muscle fibers and pain³.

Thus, to minimize the effects caused by TMD, physiotherapy becomes a fundamental and integral part of these patients' treatment.

Given the above, this study aimed to organize the scientific evidence on the physiotherapeutic treatments used in patients with temporomandibular disorders.

CONTENTS

The systematic review was carried out from a retrospective consultation with Scielo, Pubmed and LILACS databases. Articles collection was carried out in September 2016, and the search strategy was formulated through the descriptors crossing (DeCS and MeSH). Only the researches with patients diagnosed with temporomandibular dysfunction or disorder and treated with physiotherapy techniques were included. Also, the studies should be in Portuguese or English, published from August 2006 to August 2016. In Scielo and LILACS (DeCS) bases, the following crossings were used: "temporomandibular joint" AND "physiotherapy" OR "temporomandibular joint disorders" AND

"physiotherapy." In Pubmed (MeSH), articles were obtained through crossings between "temporomandibular joint" AND "physiotherapy techniques" OR "temporomandibular joint disorders" AND "physiotherapy techniques". In the initial phase, titles and abstracts were independently identified and evaluated by two reviewers to select those meeting the eligibility criteria. Articles that did not fit the criteria described were excluded by the title review, followed by exclusion by the abstract, and finally, the potentially relevant studies were retained for further analysis of the full text. The relevant information was presented in the form of descriptive tables, considering the following variables: year, country, sample, evaluated outcomes, methodological design, intervention, and effects found.

In the initial search in the databases were found 32 articles. After the first selection by title, 13 articles were excluded, remaining 16 for abstracts analysis. From these, 11 articles were selected that fit the established inclusion criteria. Figure 1 shows the selecting process of the included articles. Table 1 presents the list of selected studies that used physiotherapeutic techniques for temporomandibular disorders treatment.

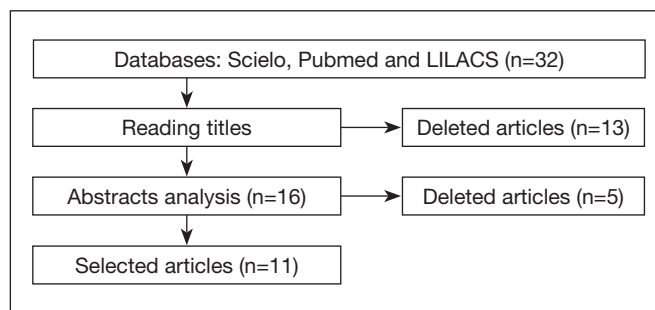


Figure 1. Data search

Table 1. Description of selected studies that used physiotherapeutic techniques for temporomandibular disorders treatment

Study	Sample	Evaluated outcomes	Methodological design	Intervention	Effects found
Priebe, Antunes and Corrêa ³	Average: 31.6 years. Individuals of both gender: 20 women and 5 men	Questionnaire on Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). Evaluation records of joint noises presence, painful sensation of muscle and articulation regions, pressure pain threshold values in 16 muscles evaluated bilaterally: anterior, mid and posterior temporal, superior, mid and inferior masseter, sternocleidomastoid and upper trapezium, through pressure algometer.	Longitudinal study	Physiotherapy program included the combination of therapeutic modalities, focusing on the craniocervicomandibular system structures, such as therapeutic ultrasound, myofascial release, manual therapy, stretching and neuromuscular exercises, as well as self-care and home exercise guidelines.	76% presented no diagnosis of TMD soon after treatment. Of these, 17 (68%) maintained this result at the two-month follow-up, according to the RDC/TMD evaluation. Regarding the sensitivity of pain to pressure, there was no significant difference in pain threshold in the comparison of results shortly after treatment and after two months of its end. Joint noises kept absent in 60% of patients. Regarding pain during palpation, 21 of the 24 structures analyzed in RDC/TMD maintained post-treatment results in the follow-up period, except for the right lower masseter, right lateral pterygoid and left temporal tendon.

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Table 1. Description of selected studies that used physiotherapeutic techniques for temporomandibular disorders treatment – continuation

Study	Sample	Evaluated outcomes	Methodological design	Intervention	Effects found
Franco et al. ¹⁶	A 35-year-old female patient 10 sessions, 1 time per week	Physiotherapeutic evaluation sheet, composed of ROM evaluation, inspection, palpation, physical exams.	Case report, evaluated before and after intervention and reassessed 15, 30 and 60 days after intervention.	Performed passive stretching of ECOM and trapezium, low-intensity laser application of gallium arsenide (AS-GA) 4J parameters for the area of the joint in a punctual form and 8J in the muscular area in the punctual form and scanning with 1mm, with pulsatile mode 1 min per point. Facial relaxation with slip techniques, guidelines for complementary home exercises, active stretching of the cervical muscles, extensors and flexors of the head and neck. MTP deactivation technique. Night maintenance of the myorelaxing occlusal plaque	There was a gradual reduction of painful sensations through VAS, the relief average of pain symptoms was 20% per session, reaching zero in the last sessions.
Freire et al. ⁶	Average: 34.5 years 24 individuals (21 females and 3 males)	Questionnaire on Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Temporomandibular index (TMI) and its sub-indexes	Longitudinal study, 10 sessions. Evaluated before treatment (AV1), immediately after treatment (AV2) and two months after the end of treatment (AV3)	Continuous 3 MHz ultrasound, with the intensity of 1.3 W/cm ² , for 3 minutes for chronic pain; in pulsed mode with an intensity of 0.5 W/cm ² , for 3 minutes for acute pain. Superficial thermotherapy with infrared radiation for 20 minutes. Myofascial release and stretching bilaterally. Techniques of distraction and therapeutic massage in the cervical spine and the TMJ. Exercise with silicone rubber tube	Reduction in diagnoses number in all subgroups and diagnosis absence in 41.7% of the 24 participants after treatment. Significant reduction of TMI in the comparison between AV1 and AV2 (p = 0.000). There was no difference between AV2 and AV3 (p = 0.204) in 13 participants evaluated two months after the end of treatment.
Amaral et al. ⁷	Average: 25.6 years. 50 individuals of both gender	Questionnaire on Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Stabilometric evaluation on a force platform, with eyes open and closed.	Longitudinal study DTM Group (presenting TMD, mandibular deviation or deflection) and control group (not presenting TMD)	Non-specific mandibular mobilization (MMI). The patient is positioned in dorsal decubitus and disposable gloves were used by the therapist; the fifth chierodactyl positioned on top of the second or third molar (if present) to perform the MMI in a small degree intermittently for one minute, with five replicates being performed. Between each mobilization, a buccal opening with tongue was performed ten times on the incisive papilla, to promote local relaxation.	Statistically significant difference was only for the TMD group at the center of pressure oscillation (p <0.03) in the mediolateral displacement (p <0.006), in the mediolateral amplitude (p <0.01) and in the velocity variable in the antero-posterior directions, (p <0.03) and mediolateral (p <0.03).
Gomes et al. ⁵	Average: 22.5 years. 25 individuals of both gender.	RDC/TMD questionnaire. - Evaluation of pain through VAS.	Randomized, double-blind clinical trial. EG (experimental group): 10 applications of HVES and in PG (placebo group): 10 applications with the device switched off.	Electrodes placed bilaterally on the lateral portion of the temporalis muscle (channel 1), on the masseter (channel2) and the electrode dispersed in the cervical-thoracic (lower cervical high thoracic) region. Parameters used 10Hz frequency; pulse width fixed by the device in two twin pulses of 20us each with an interval of 100us voltage at 100 volts both channels lasting 30 min 2 to 3 times per week.	Intragroup comparison observed that 10 applications of cathodic HVES promoted the reduction of pain in the EG, while in the GP no difference was noticed. EG presented greater reduction of pain intensity compared to PG.

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Table 1. Description of selected studies that used physiotherapeutic techniques for temporomandibular disorders treatment – continuation

Study	Sample	Evaluated outcomes	Methodological design	Intervention	Effects found
Borin et al. ⁸	40 women, aged between 20 and 40 years	RDC-TMD questionnaire, the severity of TMD was verified before and after treatment by Fonseca's Index. It was also evaluated the Craniomandibular Dysfunction Index. The pain was assessed before and after treatment, by VAS.	Randomized clinical trial. Individuals divided into two groups: AG: acupuncture, who performed the intervention twice a week (n = 20); and control CG: who did not undergo treatment	AG participants underwent acupuncture twice a week for five uninterrupted weeks. The treatment was performed with disposable needles (0.25 x 0.15 mm) inserted in the respective points with the skin previously cleaned with cotton and ethylic alcohol at 70%. Acupuncture therapy amounted 10 assistances. The points selected for treatment were those referred to in the literature as points for the treatment of TMD and points for anxiety.	There was an improvement in the severity level by the craniomandibular index (p = 0.004) and by the Fonseca's Index (p = 0.000) of individuals with TMD after acupuncture treatment, and in the pain level (p = 0.000). According to the classification by Fonseca's Index. Before treatment, the individuals had the following classification for TMD: 6 with a moderate degree and 14 with a severe degree. After treatment, this classification was observed: 7 with a mild degree, 10 moderate and 3 severe.
Basso, Corrêa and Silva ⁴	Participated in the study 20 individuals of both gender Average age: 27.5 years.	RDC/TMD questionnaire. Photography with a digital camera for postural evaluation.	Transversal, qualitative study, 10 weeks of intervention. GI: muscle disorder; GII: disk displacement; GIII: other joint conditions.	The intervention group was submitted to 10 sessions of GPR for 45 minutes, once a week adopting two postures per session of therapy. Postures without load and postures with load.	GII obtained an improvement in the reduction of chronic orofacial pain.
Calixtre et al. ¹²	12 women with a mean age of 22.08 ± 2.23 years	The mandible's pain and function were evaluated with the MFIQ, in addition to the opening level of the mouth without pain and the GP of masseter and temporal muscle were evaluated.	Longitudinal study, pre-and post-evaluation 5 weeks of intervention.	Submitted to 10 sessions of approximately 35 min. Mobilization of cervical under flexion, anteroposterior and posteroanterior mobilization in C5, stabilization exercise of craniocervical flexion, stretching	Mandibular function increased by 7 points on the scale after the intervention (p = 0.019) and pain decreased significantly (p = 0.009). The mandible level of opening ranged from ± 8.8 to 38.8.8 mm to 38 ± 8.8 showing significant improvement (p = 0.017), pain on both masseters and temporalis improved
Machado et al. ¹¹	Participated in the study 82 individuals with chronic TMD and 20 healthy individuals (average age 30 ± 9.6 years)	DTM severity through Part II of ProDTMMulti Questionnaire, stress points due to palpation, and orofacial functionality by Orofacial Myofunctional Evaluation with Scores.	Randomized clinical trial. Participants were divided into GI: Laser and oromandibular exercises, GII: orofacial muscular therapy, GIII: placebo laser and oromandibular exercises, GIV: Laser, CG: healthy.	Submitted to 12 sessions of 45min. GI: continuous laser I = 60mW by 40s and D = 60 ± 1.0 J/cm ² and exercises for tongue, cheeks and mandibular muscles, functional orofacial training; GII: exercises for tongue, cheeks and mandibular muscles, functional orofacial training; laser; strategies for pain reduction; GIII: placebo laser and exercises; GIV: laser.	There was an improvement in both groups in all scopes assessed with stability at follow-up when compared to each other all treated groups did not show differences in stress points due to palpation at follow-up. GI, GII and GIII showed no difference with the control over orofacial function, while they differed significantly from GIV (p <0.01).
Oliveira et al. ¹⁵	32 young adults with an average age of 24.7 ± 6.8 years diagnosed with TMD.	Fonseca's questionnaire was used for the initial screening of patients; then VAS was used for pain and WHOQOL-BREF was used for Quality of Life.	Clinical trial, double-blind. The patients were divided into two groups: A - active submitted to exercise plus transcranial noninvasive stimulation and B - control who performed exercises plus false stimulation.	The treatment protocol lasted 4 weeks; all participants performed exercises that included myofascial release, muscle stretching, cervical traction, exercises to improve mandible's ROM, muscle strengthening, among others. In addition, Group A received 20 min of noninvasive transcranial stimulation with an amplitude of 2 mA, with electrodes located on C3 or C4 (motor cortex region); in the individuals of Group B the electrodes were positioned in the same place, but the current lasted 30 seconds.	The clinical characteristics of the disease in the two groups were the same after the treatment, and regarding the quality of life, it can be perceived that both groups obtained positive results. Groups' pain intensity decreased after the second day of treatment, but in different ways and, in the end, it was noticed that Group A had lower pain levels than Group B, but the difference was not statistically significant.

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Table 1. Description of selected studies that used physiotherapeutic techniques for temporomandibular disorders treatment – continuation

Study	Sample	Evaluated outcomes	Methodological design	Intervention	Effects found
Tosato et al. ⁹	n = 20 women, aged between 22 and 46 years, with an average of 31.75±8.71 years, with myogenic TMD, with masticatory muscle pain.	After this, RDC-TMD for pain used the VAS and surface electromyography to capture the electrical signal of the masseter and temporal muscles.	Randomized clinical study. Individuals divided into G1: control and G2: intervention	The sample was divided into 2 groups: Group 1 received a 30-minute session of massotherapy on the face, masseter and temporal region, while Group 2 received transcutaneous electrical nerve stimulation for 30 minutes in the region of the masseter and temporal muscles.	Both groups showed an increase in the electromyographic activity of the masseter and temporal muscles, both in isometric contractions and concentric isotonic. There was also a significant reduction in pain in both groups.
Freitas et al. ¹⁰	1 patient, 37 years old, diagnosed with TMD for 5 years.	From the VAS, the pain was evaluated; mandibular ROM and postural clinical evaluation were measured.	Clinical case study	The laser was used in the TMJ region using ad-hoc technique with energy density (ΔE) 3J/cm ² and reaching a final energy of 2.6 J, deactivation of myofascial trigger points in the masseter, pterygoid, temporal, occipital, scalene, ECOM and trapezius upper fibers, for 45 seconds at each point and joint mobilization using the longitudinal and anterior cephalic slide technique of TMJ grade II	The patient presented improvement in pain, increased the joint amplitude of TMJ and in the following postural alterations: prognata mandible, head in neutral position, cervical spine with physiological lordosis and shoulders aligned. In the muscular portion, there was an improvement in the time of muscular activation in the face muscles.

ROM = range of movement; VAS = visual analog scale; MTP = myofascial trigger points; TMD = temporomandibular dysfunction; HVES = high voltage electrical stimulation; GPR = global postural reeducation; RDC-DTM = diagnostic criteria for the investigation of temporomandibular disorders; MFIQ = Mandibular Functional Impairment Questionnaire.

DISCUSSION

This study revealed effective results in relation to the physiotherapeutic treatments used for TMD. Basso, Corrêa and Silva⁴ and Gomes et al.⁵ studies reported that physical therapy is capable of promoting improvement of clinical symptoms related to pain. Besides, in general, physiotherapy stimulates the proprioception and production of synovial fluid in the joint and improves the elasticity of adhered muscle fibers³.

Analyzing the results obtained by the search strategy, it was observed a greater concentration of studies in 2015, with a single publication in 2010. It is worth mentioning that the surveys were developed in North and South American territory. It is also evidenced that the studies participants were volunteers of different age groups. However, the average age of the samples analyzed corresponded to the middle-aged population. These same studies indicate a high percentage of women. However, there is still no consensus in the literature about the reason for the higher prevalence in females than in males.

From the 11 articles that were used in this study, seven used the Questionnaire of Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) as an evaluation form. This questionnaire is recognized worldwide and aims to establish reliable and valid criteria for diagnosing and defining TMD subtypes³⁻⁹. In the case report studies, a physical therapy assessment sheet was used, which included: inspection, range of motion, palpation and physical examination¹⁰.

Another important aspect in the treatment of TMD is the frequency and duration of physiotherapy sessions. Considering the number of sessions, in seven studies were performed 10. However, in the study by Freitas et al.¹⁰, the author felt the need for a larger number of sessions, totaling 15 sessions. This shows that most authors agree with the number of sessions performed. When analyzing the sessions frequency, there was disagreement with the studies by Priebe et al.³ and Basso, Corrêa and Silva⁴ for example, where the number was once a week, while Borin et al.⁸, Freitas et al.¹⁰ performed twice a week.

It should be emphasized that TMD may be related to posture. In the studies by Basso, Corrêa and Silva⁴ and Freitas et al.¹⁰, the postural evaluation was carried out in order to find evidence such as head anterioration, cervical lordosis increase and no leveling of the shoulders. Amaral et al.⁷ used stabilometry as an evaluation method. This test is a way to measure the static balance, which consists of quantifying the anteroposterior and lateral body oscillations, while the individual remains standing on a force platform. These parameters evaluation becomes important, as it is known that TMD can cause changes in balance.

TMD may present as muscular and/or articular pain, decreased buccal amplitude, headache, mandibular movement disorders, and articular cracking⁵. During the research process, it was noted that the pain variable was the only one unanimously selected in the studies. Pain is one of the main symptoms reported by patients with TMD, with 75% of them experiencing temporomandibular joint discomfort or dysfunction. One of the meth-

ods found for pain evaluation was through visual analogue scale (VAS)^{5,9,10,16}. Only the study performed by Gomes et al.⁵ presented a sample calculation based on the standard deviation values obtained by VAS, providing measurements of pain intensity. In turn, Priebe, Antunes and Corrêa³ used the pressure algometer – Force Dial® FDK/FDN Dynamometer (Wagner Instruments) – as a method to evaluate this item. Both were satisfactory for the evaluation of pain parameters in these patients.

The physiotherapeutic treatment aims at relieving the symptoms, seeking to restore the normal function of the patient's masticatory device, for which different techniques can be used. According to the studies, the devices like laser, ultrasound and cathodic current, are beneficial in the treatment. However, manual therapy through muscle stretching exercises, joint mobilizations and exercises for cervical segmental stabilization may be included in the rehabilitation process^{7,10-12,16}.

Tosato, Biazotto-Gonzalez and Caria⁹ used electromyography to evaluate the electrical activation of the masseter muscles and anterior portion of the temporalis muscle and the VAS to measure the pain. The sample comprised of 20 women was divided into two groups. Both went through the evaluation process described. Then, group 1 was submitted to 30 minutes of massotherapy in the masseter region and anterior portion of the temporalis; group 2 received 30 minutes of transcutaneous electrical nerve stimulation in the same muscles. Then, both groups were reevaluated, and both presented greater muscle activation and statistically significant reduction of pain, showing that manual therapy is beneficial and can be used to reduce TMD pain. Machado et al.¹¹ investigated the combination efficacy of low-intensity therapeutic laser use with oral motor exercises in the rehabilitation of TMD-patients. 82 patients were selected with chronic TMD and 20 were considered healthy patients, who formed the control group. Individuals were randomly divided into 5 groups. GI: laser + orofacial exercises; GII: orofacial myofunctional therapy, which consisted of pain relief and orofacial exercises; GIII: placebo laser and orofacial exercises; GIV: laser. Laser aimed to analyze the analgesia (parameters used: 780-nm wave size, intensity of 60 mW, 40 and 60±1.0 J/cm²), and orofacial exercises were used to restore its functionality. All treated groups had a significant improvement over the control group. Comparing the treated groups, it was observed that the groups that used laser and orofacial exercises and orofacial myofunctional therapy obtained results that are more effective. Franco et al.¹⁶ also used the low-intensity laser, associated with cervical's muscle stretching exercises and myorelaxing occlusal nocturnal plaque. The intervention lasted 10 sessions and reduced the pain.

Joint mobilization was chosen as a treatment in Amaral et al.⁷, Freitas et al.¹⁰ and Calixtre et al.¹² study. However, each study had its particularity. In the study by Amaral et al.⁷, nonspecific mandibular mobilization (MMI) was used in order to promote improved postural control in individuals with TMD. Freitas et al.¹⁰, in addition to joint mobilization, used the deactivation of myofascial trigger points and cervical stabilization exercise as a treatment for TMD, improving aspects such as pain, muscle balance, and posture. Calixtre et al.¹² performed C5 joint mobilization, cervical stabilization exercises and passive muscle stretch-

ing of the upper dorsal region, and obtained an increase in the mouth opening and pain reduction.

Basso, Corrêa and Silva⁴ show that the posture in individuals with TMD is impaired. In this study was used the GPR, proposing a therapeutic action of stretching aiming at the balance of myofascial tensions and body posture as a whole. This treatment can reduce the orofacial pain intensity and improve psychological symptoms of TMD, as well as improved body alignment and symmetry.

The treatment can also be focused on the craniocervicomandibular system structures, as pointed out by studies by Priebe, Antunes and Corrêa³ and Freire et al.⁶. The passive stretches of the ECOM and trapezium muscles, facial relaxation with slide techniques, active stretching of the cervical musculature, head and neck extensors and flexors were techniques used.

The application of acupuncture needles can also bring benefits to the TMD handling, which aims at controlling pain, especially that of muscular origin. Borin et al.⁸ applied needles at specific points in the zygomatic arch region, in the masseter muscle and the mastoid process. After the intervention, it was observed that acupuncture promotes a significant reduction in the pain level and the severity of TMD, demonstrating a 75% reduction in pain grade ($p = 0.000$).

El Hage et al.¹³ investigated the immediate effect of facial massage on static balance in individuals with TMD. In this study, 20 individuals diagnosed with TMD were evaluated using an equilibration platform that calculated the oscillations occurred in the anteroposterior and mid-lateral planes. The evaluations occurred with eyes closed and open, at the first moment before rest (baseline), after 10 minutes rest in dorsal decubitus (pre-massage) and after the application of the technique (post-massage). Results showed that there was only a significant difference in the evaluation performed with the eyes closed in the anteroposterior oscillations.

In other study performed by Amaral et al.¹⁴, the same protocol was used to evaluate the effects of non-specific MMI. The participants were divided into two groups: 25 individuals with TMD and 25 individuals without TMD. The mobilization consisted of the therapist positioning the fifth chierodactyl on the second or third molar for a minute, in a small degree of amplitude, promoting the mandible in protrusion displacement by five times. Between each repetition, there was a local relaxation. According to the evaluation after MMI, there was an improvement of the postural control in both groups, suggesting a possible stimulation of the trigeminal system that, in turn, would influence the balance.

More current techniques for the TMD treatment were one of this review's outcomes. Noninvasive stimulation, including transcranial direct current stimulation (TDCS), [AS1] [RSM2] may be considered as an alternative for pain treatment. Oliveira et al.¹⁵ evaluated pain and quality of life of TMD patients after being submitted to physiotherapeutic intervention and noninvasive stimulation during four weeks. Participants were divided into two groups (group A and group B) who performed exercises that included myofascial release, muscle stretching and strengthening, cervical traction, exercises to improve the range of mandible

motion. Also, group A received 20 min of TDCS with an amplitude of 2 mA, with electrodes located on C3 or C4 (motor cortex region), while group B received sham stimulation. Groups' pain intensity decreased differently, and at the end of treatment, it was noticed that group A had lower pain levels than group B, but the difference was not statistically significant.

Physiotherapy is effective and improves the physical function of individuals with TMD. From this review, it is noticed that several resources such as ultrasound, laser, cathodic current or manual therapies such as muscle stretching, and joint mobilization bring remarkable benefits. However, with the poor methodological quality, small number of individuals participating in most studies leaves a gap on the best treatment for TMD. Besides, more randomized clinical trial studies and follow-up evaluations are needed.

CONCLUSION

Physiotherapy may benefit TMD patients by reducing pain and increasing mobility, as well as rebalancing the TMJ.

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