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Effectiveness of manual therapy in masticatory muscles for tmd patients - a review of the literature

Eficácia da terapia manual em músculos mastigatórios para pacientes com dtm - uma revisão da literatura

Eficacia de la terapia manual en músculos masticatorios para pacientes con tmd - revisión de la literatura

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Abstract

Objective: Evaluate, through a systematic literature review, the efficacy of manual therapy (MT) in the release of masticatory muscles in patients with temporomandibular disorders (TMD) compared to other forms of treatment. Methods: Electronic databases as SCOPUS, PUBMED and Web of Science were used to search for randomized controlled clinical trials. The selected trials were classified according to the Jadad scale. Results: The combined use of MT with education and self-care may be safer than performing as an isolated technique when considering a period longer than 1 year due to the maintenance of the effect. Conclusions: The included studies concluded that MT alone has significant effects on pain reduction at different follow-up periods. However, due to the diversity in number of sessions, duration of sessions and follow-up times, it becomes necessary to use standardized protocols.

Keywords: Temporomandibular joint disorder; Craniomandibular disease; Mandibular disease; Temporomandibular joint dysfunction syndrome; Manual therapy.

Resumo

Objetivo: Avaliar, por meio de revisão sistemática da literatura, a eficácia da terapia manual (TM) na liberação dos músculos mastigatórios em pacientes com disfunção temporomandibular (DTM) em comparação a outras formas de tratamento.Métodos: bases de dados eletrônicas como SCOPUS, PUBMED e Web of Science foram utilizadas para busca de ensaios clínicos controlados randomizados. Os ensaios selecionados foram classificados de acordo com a escala de Jadad.Resultados: O uso combinado da TM com educação e autocuidado pode ser mais seguro do que realizar como técnica isolada quando se considera um período superior a 1 ano devido à manutenção do efeito.Conclusões: Os estudos incluídos concluíram que a MT sozinha tem efeitos significativos na redução da dor em diferentes períodos de acompanhamento. No entanto, devido à diversidade no número de sessões, duração das sessões e tempos de seguimento, torna-se necessária a utilização de protocolos padronizados**.**

Palavras-chave: Disfunção da articulação temporomandibular; Doença craniomandibular; Doença mandibular; Síndrome da disfunção da articulação temporomandibular; Terapia manual.

Resumen

Objetivo: Evaluar, mediante una revisión sistemática de la literatura, la eficacia de la terapia manual (MT) en la liberación de los músculos masticatorios en pacientes con trastornos temporomandibulares (TTM) en comparación con otras formas de tratamiento.Métodos: Se utilizaron bases de datos electrónicas como SCOPUS, PUBMED y Web of Science para buscar ensayos clínicos controlados aleatorios. Los ensayos seleccionados se clasificaron según la escala de Jadad. Resultados: El uso combinado de MT con educación y autocuidado puede ser más seguro que realizarlo como técnica aislada cuando se considera un período mayor a 1 año debido al mantenimiento del efecto. Conclusiones: Los estudios incluidos concluyeron que la MT sola tiene efectos significativos sobre la reducción del dolor en diferentes períodos de seguimiento. Sin embargo, debido a la diversidad en número de sesiones, duración de las sesiones y tiempos de seguimiento, se hace necesario utilizar protocolos estandarizados.

Palabras clave: Trastorno de la articulación temporomandibular; Enfermedad craneomandibular; Enfermedad mandibular; Síndrome de disfunción de la articulación temporomandibular; Terapia manual.

1. Introduction

According to the health sciences definitions, temporomandibular dysfunction (TMD) is a variety of conditions that affect the anatomy and functional characteristics of the temporomandibular joint (TMJ) (Gil-Martínez, 2018). The etiology of TMD is complex and multifactorial. Evidence shows that there are predisposing factors, initiating factors and perpetuating factors that contribute to this dysfunction (Oral, et al., 2009).

The main observed signs and symptoms reported by patients with the dysfunction are: pain in the TMJ region and under palpation of the masticatory muscles, joint noises, mandibular deviations, limitation of mouth opening, muscle fatigue and tiredness, headache and dental wear (Paulino et al., 2018). Epidemiological studies suggest that these symptoms occur predominantly in young adults and women (Campos, et al., 2014).

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) widely used for TMD research since its publication in 1992 (Campos, et al., 2009). Through a series of workshops and symposia, in 2014, specialists in clinical and scientific pain modified the RDC/TMD Axis I algorithms and proposed new Axis II instruments, creating the Diagnostic Criteria Protocol for TMD (DC / TMD) , which demonstrates greater sensitivity and specificity for the diagnosis of pain and joint disorders.

Currently, the initial management of patients with temporomandibular dysfunction occurs through conservative interventions (Michelotti, et al., 2005; Maluf, 2008) without an established standard conduct. Among these therapies, the most common are education and self-care, home exercises, occlusal plates, pharmacotherapy and physiotherapy. Physiotherapy generally applies different therapeutic techniques, such as electrical stimulation, low intensity laser therapy, ultrasound, acupuncture and relaxation, exercises with biofeedback, active exercises and manual therapy (Maluf, 2008).

Manual Therapy (MT), which is a physiotherapy technique, includes several exercises that are widely indicated because of the self-management feature, low cost and good efficiency (Calixtre, et al., 2015). Therapeutic exercise and MT are indicated to improve strength, coordination and mobility and to reduce pain. The treatment may include and focus on poor posture, cervical muscle spasm or pain and treatment for cervical orofacial pain (Armijo-Olivo, et al., 2016).

In view of the above, the objective of the present study was to review the literature on the efficacy of myofascial release and the massage of the masticatory muscles in patients with TMD, as this therapy technique has not yet been fully elucidated as to its indication on the improvement of TMD signs and symptoms.

2. Methods

Three reviewers searched independently the Web of Science, PUBMED and SCOPUS databases, including articles in Portuguese and English, published between 1992 and April 2018. The search terms used were taken from MeSH (Medical Subjets Headings) and text words. The key words used were “Temporomandibular Joint Disorders” OR "Temporomandibular Joint Dysfunction Syndrome" OR "Craniomandibular Disorders" AND "Musculoskeletal Manipulations" OR "Manipulation, Osteopathic".

The studies selected to compose this review fulfilled the following criteria:

1. Controlled clinical trials;

2. Diagnosis of TMD through RDC / TMD or DC/TMD

3. Treatment for TMD with manual therapy evaluating the variables: pain, mouth opening and mandibular movements;

4. Articles published from 1992.

We excluded studies that analyzed patients with systemic involvement (cancer, rheumatic disease, neurological problems, migraine and fibromyalgia); trauma; fracture or surgery in the craniomandibular system or with serious comorbidity. Studies that associated manual therapy with other forms of treatment were also excluded.

Repeated articles found in the search were considered only once and the examiners analyzed all titles and abstracts that met the inclusion or exclusion criteria independently.

Any disagreements during the screening process was resolved by consensus among the examiners.

Articles selected after reading the full text were assessed for their methodological quality by following the Jadad scale (Jadad, et al., 1996), method of qualifying the studies, assigning them scores from 0 to 5. The clinical trial to be considered of a high quality should have a score of ≥ 3 points and to be low quality a score of ≤ 2 points.

Table 1. (Jadad).

Table 1. Jadad Scale

Criteria	Score	
	Yes	No
Did the study describe randomization?		
Did the study describe the blinding process?		
Did the study describe lost and dropouts?		
The randomization method was described appropriately?		
The blinding process was described and appropriate?		

Score: 1 point for each yes and 0 points for each no. Source: Authors.

3. Results and Discussion

The electronic search resulted in 1222 published articles. According to the inclusion and exclusion criteria, nine articles were selected for full text reading.

The final result of the selection process resulted in three articles for systematic review (Table 2)

Table 2. General caractheristics of the studies included in this systematic review

STUDY	STUDY DRAW	SAMPLE	TREATMENTS GROUP	ACOMPANYING PERIOD	MEASURE INSTRUMENTS AND EVALUATION DEVICES
Kalamir et al 2013	Randomized clinical trial	46 patients 17 men e 29 women 18 to 50 years	G1: Diverse Myofascial Release Techniques G2: counseling, teaching and supervision of physical therapy self-care exercises	The treatment was performed twice a week for 5 weeks. Patients were evaluated before treatment and after 6 weeks	RDC / TMD: diagnosis of TMD; Analog visual scale: pain at rest, Pain on maximum active opening and Pain on clenching; Measurement of mouth opening in mm
Kalamir et al 2012	Randomized triple blind clinical trial	93 participants 41 men e 50 women 18 to 50 years	G1: Intraoral myofascial therapy G2: Myofascial therapy + education and self-care G3: control group	G1: 2 sessions within 5 weeks, each session lasting 10 to 15 minutes G2: in the first 4 visits, after the manual therapy was applied, a 2 minutes lecture was done. G3: waiting list Patients were evaluated for 6 weeks, 6 months and 1 year	RDC/TMD Graded chronic pain rating: pain at rest, pain at the opening and pain when clenching; Vernier caliper: to evaluate oral opening.

Guarda-Nardini et al 2012	Randomized clinical trial	30 participants 22 women and 8 men 23 to 69 years	G1: Botulinum toxin G2: Facial manipulation	G1: a session of application of toxin in masseters and temporalis; G2: three sessions of 50 minutes per week for two to four weeks Patients were evaluated at baseline and after 3 months Pain assessment was also performed immediately after the treatments. One hour after the toxin and at the last manipulation session.	RDC / TMD Analog visual scale: pain levels; Range of movement in mm.

Continuing from table 2

Study	Results	Conclusion
Kalamir et al 2013	When comparing with the baseline, the group receiving manual therapy presented mean pain, significantly lower than the self-care and	The work showed evidence of superiority of manual therapy in relation to counseling and self-care, in the short term. However, it did not present clinically significant

	counseling group in all outcomes (p <0.001). The group receiving manual therapy was also more likely to present a significant clinical difference (p <0.045). There was no significant difference in mouth opening between the two groups. Both groups had statistically significant reduction in the three pain measures after 6 weeks.	levels. In the long term, results should be interpreted with caution and further studies should be performed.
Kalamir 2012	Both treatment groups had significantly reduced pain scores compared to the control group at all periods. Only in the 1-year evaluation, the manual therapy group associated with education and self-care presented better pain scores than the isolated IMT group and the control group. For the pain and range of motion findings, both groups were similar. There was a regression in this finding in the 1 year period, however the results presented statistical significance in relation to the baseline.	The use of IMT techniques combined with education and self-care have shown that these techniques can be used safely and may be superior to non-treatment or IMT alone at 1 year. This study also suggests that physiotherapists may play a role in the care of these complex and multifactorial disorders.

Guarda-Nardini et al 2012	Both treatment protocols provided significant improvement over time in pain symptoms. The patients in the botulinum toxin group showed a slight increase in the parameters of the movement of the mandible (mouth opening). Patients remained almost constant over time.	Both treatments allowed an improvement in regard to pain levels compared to the baseline. In the short term, three months, the two treatments appear to be almost equally effective, with facial manipulation being slightly superior in reducing the subjective perception of pain and injections of botulinum toxin being slightly superior in increasing the range of motion of the mandible.

(Kalamir, et al., 2012; Kalamir, et al., 2013; Guarda-Nardini, et al., 2012).

Six were excluded because they did not present RDC / TMD as a diagnostic form of TMD (Table 3).

Table 3. Description of the excluded studies from this systematic review and the reason for exclusion

DATABASE	STUDY	TITLE	REASON FOR EXCLUSION
PUBMED	Calixtre et al 2016	Effects of cervical mobilization and exercise on pain, movement and function in subjects with temporomandibular disorders: a single group pre-post test.	Before and after evaluation but no comparison with a control group

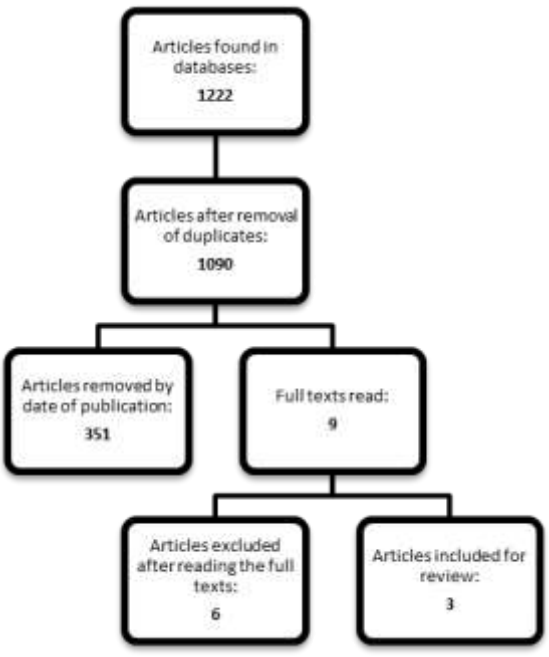
SCOPUS	Cuccia et al 2010	Osteopathic manual therapy versus conventional Conservative therapy in the treatment of Temporomandibular disorders: a randomized Controlled trial	Did not use the RDC for the TMD diagnostic; in the manual therapy group, patients were under medications whenever it was necessary, associating MT and medications.
PUBMED	Rybalov et al 2016	The effectiveness of physical factors in the treatment of compression-dislocation dysfunction of the temporomandibular joint.	Did not use the RDC for the TMD diagnostic.
PUBMED	La Touche et al 2009	The effects of manual therapy and exercise directed at the cervical spine on pain and pressure pain sensitivity in patients with myofascial temporomandibular disorders	Before and after evaluation but not between groups
PUBMED	Packer et al 2015	Effect of upper thoracic manipulation on Mouth opening and electromyographic Activity of masticatory muscles in women	Osteopathic manipulation of the cervical region only

		With temporomandibular disorder: a Randomized clinical trial	
PUBMED	Packer et al 2014	Effects of Upper Thoracic Manipulation on Pressure Pain Sensitivity in Women with Temporomandibular Disorder	Osteopathic manipulation of the cervical region only

Source: Authors.

The details of the inclusion and exclusion process are presented in the figure (Figure 1).

Figure 1. Flowchart of the article selection process.



Source: Authors.

Participants

According to the inclusion criteria in the 3 selected studies the patients were diagnosed with TMD of muscular origin through RDC / TMD. They were predominantly female subjects, aged between 18 and 69 years, a total of 169 subjects were analyzed.

Three clinical trials published between 2012 and 2013 varied in the type of manual therapy for treatment of muscular TMD. Two studies used a pre-established intraoral manipulation protocol[14] and another study used extraoral facial manipulation based on the patient's pain description. In regards to the comparison groups, the study (Kalamir, et al., 2013) correlated intraoral manual therapy with education and self-care. Kalamir, et al. (2012) compared three groups: manual therapy alone, manual therapy associated with education and self-care and without intervention and Guarda-Nardini, et al. (2012) evaluated two groups: facial manipulation and botulinum toxin.

In Kalamir, et al. (2013), patients were allocated to two treatment groups: G1: manual therapy and G2: education and self-care. In the first group, facial manipulation was performed with an intraoral approach according to a pre-established protocol (Kalmir, et al., 2012) in the masseter, temporalis and pterygoid muscles. This therapy was performed in two sessions over a five-week period. In the education and self-care group, patients had the etiology and pathophysiology of the dysfunction explained and were instructed to perform exercises for the masticatory muscles during the session and individually twice a week for 5 weeks. Monitoring of both groups was performed at baseline and after weeks.

The outcomes analyzed consisted of pain at rest, pain at the maximum opening, pain on clenching and interincisal opening measured in millimeters, as a secondary outcome. The authors concluded that patients with myogenic TMD who received manual therapy achieved significantly lower pain scores than in the education and self-care group. In addition, they observed that intraoral manipulation technique presents greater chances of reaching clinical significance. Both treatments indicated effect over the course of six weeks, but the short duration suggests that these data should be interpreted with caution.

Kalamir, et al. (2012), observed two therapies compared to a control group without intervention. They were manual therapy and manual therapy associated with education and self-care. The methodologies of treatments with manual manipulation and education and self-care were the same ones performed in Kalamir, et al (2013). However, in this work manual therapy was evaluated alone and in combination with education and self-care. The evaluated outcomes were also equal with the inclusion of global change reporting (GCR) findings. This

report concerns an assessment of clinical change taking into account the patient's report. All groups presented significant improvement in pain scores at all times, butthe combination group showed clinical superiority over the isolated manual therapy group and control group, in the one-year analysis.

In the study conducted by Guarda-Nardini, et al. (2012) a group of patients received a single session of botulinum toxin injections in multiple areas in the temporalis and masseter. The application was performed using a 0.7mm and 30G needle with a total of 150 U of the toxin injected on each side. A minimum of five injections were applied to the muscles. For the masseter muscle, a pattern was made in reverse pyramid and in the temporal muscle the standard chessboard, according to the technique already reported in literature (Paesani & Cifuentes, 2010; Manfredini, & Guarda-Nardini, 2010). Another group received facial manipulation, focusing on the description of the pain points reported by the patient. Therapy occurred according to the standards established by the Facial Manipulation guide (Stecco, 2004). The treatment consisted of three sessions of fifty minutes totaling 150 minutes or more over a period of two to four weeks. The variables of pain levels and mandibular movements were analyzed in millimeters. Pain levels were also assessed immediately after treatment, corresponding to one hour after the application of the toxin and at the last session of facial manipulation. The therapies provided an improvement in pain levels, confirming that there may be a decrease in pain in the short term. The differences between the groups were not statistically significant.

The analysis of the methodological quality of two articles (Kalamir, et al., 2012; Kalamir, et al., 2013) was considered of good quality with score five and a study (Zhang, et al., 2016 of weak quality with score two, based on the scale of Jadad.

There is a real need for systematic reviews and meta-analyzes to be carried out with studies of high methodological quality. The use of randomized clinical trials with low quality may lead to hasty conclusions, overestimating the effectiveness of the intervention (Schulz, et al., 1995). The methodological quality of the studies presented in this review was predominantly high (66,6% of the studies).

The work done by Kalamir, et al. (2013) that evaluated the performance of intraoral manual therapy (masseter, pterygoid and temporal) in patients with muscular origin TMD compared with education and self-care in a 6-week period, showed a positive results for manual therapy in relation to pain. When evaluating mouth opening amplitude, there were no significant differences. The short evaluation period suggests caution in the interpretation of the data.

Kalamir, et al. (2012) carried out a study with the same methodology, over 1 year, in 2 intervention groups; manual therapy and manual therapy associated with education and self-care (combination) and a control group without intervention. Both treatment groups had significantly lower pain scores than the control group during the study period. The effect of the combination of therapy did not show significant superiority during the first 6 months, although after 1 year it was superior to the other two groups. Therefore, the use of a manual therapy technique combined with education and self-care may be safer than performing an isolated technique when considering a period longer than 1 year due to the maintenance of the effect.

This result corroborates the studies carried out by Craane, et al., (2012) in which patients treated with a combination of physiotherapy and education obtained results equivalent to those treated with one of the isolated therapies. The systematic review that evaluated the effectiveness of counseling and other self-management therapies also concludes that counseling in combination with other therapies may be more effective than interventions alone (De Freitas, et al., 2013).

De Laat, et al., (2003) evaluated the efficacy of treatment regimens for myofascial pain, including counseling associated with a masseter and temporalis physiotherapy program. It concluded that the conservative approach results in a significant improvement in patients' function and pain parameters.

When analyzing mouth opening, Kalamir, et al., (2013) and Kalamir, et al., (2012) pointed out that there were no significant differences that showed a superiority of using the isolated manual therapy. However, et al., (2014), in a study using the Fonseca index for TMD diagnosis, comparing the manual therapy of masticatory muscles (masseter and temporal) with an occlusal plaque group and also with a control group, showed that the therapy manual and occlusal plaques led to an increase in mandibular opening amplitude. The use of valid indexes, such as RDC / TMD for diagnosis of TMD, associated with large samples, may lead to more consistent results (Veiga, et al., 2013).

Guarda-Nardini, et al., (2012), evaluated the efficacy of facial manipulation compared to botulinum toxin injections in patients with myofascial pain for a period of three months. In this trial, performed in 30 participants, 2 groups were formed, group A submitted to botulinum toxin application and group B to facial manipulation. As for mandibular movements, the patients in group A showed better parameters when compared to the results presented by group B. When assessing pain symptoms in patients with TMD, Guarda-Nardini, et al., (2012) observed that after 3 months of therapy the patients submitted to facial

manipulation and botulinum toxin application in the masticatory muscles behaved in a similar way. Both treatment protocols provided significant improvement over time in pain symptoms.

Corroborating with Guarda-Nardini, et al. (2012), in a study of thirty-six individuals between 19 and 43 years of age and TMD symptoms, Carmeli, et al. (2001) divided the sample into two groups and evaluated the behavior of the individuals regarding their use of occlusal plaque and manual therapy. Participants in the therapy groups showed better pain scores and mandibular movements showing, similarly to Guarda-Nardini, et al. (2012) that manual therapy is a good treatment option in TMD control.

When assessing pain symptoms in patients with TMD, Guarda-Nardini, et al. (2012) observed that after 3 months of therapy, patients submitted to facial manipulation and botulinum toxin application in the masticatory muscles behaved in a similar way. Both treatment protocols provided significant improvement over time in pain symptoms. Corroborating with Guarda-Nardini, et al. (2012), in a randomized clinical trial performed with 50 individuals with TMD, Cuccia, et al. (2010), obtained a similar response for the action of manual therapy in patients with TMD. When comparing conventional osteopathy with manual therapy, Cuccia, et al (2010) observed that participants who received manual therapy responded positively to pain levels. In addition to improvement in the reported pain, subjects reduced the amount of need for analgesic drug intake.

Studies that analyzed the relationship of the thoracic region and TMD were not included in this review, since there is weak evidence of this association. When performing a quick search in the PUBMED database, using the terms: thoracic vertebrae [MeSH Terms] and temporomandibular joint disorders [MeSH Terms], three articles were found.

Among them, are those performed by Packer, et al. (2014) and Packer, et al. (2015) that previously stated that instabilities caused by limitations in this region can cause instabilities in the body, transferred to TMJ through ligaments, cartilage, muscles and fascia in the cervical region. However, significant difference after thoracic manipulation, for variables, mouth opening and facial pain at pressure, were not found.

Two studies included in the analysis did not present a control group (Kalamir, et al., 2013; Guarda-Nardini, 2012), and therefore there is a possibility that the improvement in the condition is associated with the natural cure of the disease (Whitney, & Von Korff, 1992). Although the presence of a control group was extremely important for the methodological qualification of the studies, the absence of the group was not responsible for the exclusion of articles in this review. The main determining factor in the exclusion was absence of RDC / TMD as a diagnostic form for TMD. Fricton, et al., (2010), in a systematic review that aimed

to assess the methodological quality of clinical trials for TMD, concluded that subjects should be well characterized for diagnosis. It suggests, therefore, that future clinical trials should use RDC / TMD.

While criteria for inclusion of articles were used more rigorously, this review presented the same results found in the systematic review of Calixtre, et al. (2015).

The studies used in this systematic review presented predominantly homogeneous methodologies, resulting in good internal validity. However, the different sample sizes, treatment protocols and small amount of studies included, impair the external validity

4. Conclusion

The studies included in this review showed that isolated manual therapy has significant effects on pain reduction at different follow-up periods. However, because of the diversity in the number of sessions, duration of the sessions and follow-up times, it becomes necessary to use standard protocols of manual therapy. In addition, the low number of articles included reinforces the need for further randomized controlled clinical trials using RDC / TMD as a diagnostic form for TMD and to evaluate manual therapy as a form of treatment for myofascial pain. Given the above, the need for a greater number of studies like this is evident, in order to reach a consensus on a standard manual therapy protocol.

References

Armijo-Olivo, S., et al. (2016). Effectiveness of Manual Therapy and Therapeutic Exercise for Temporomandibular Disorders: Systematic Review and Meta-Analysis. *Physical Therapy*, 96(1), 9–25. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4706597/.

Calixtre, L. B., et al. (2015). Manual therapy for the management of pain and limited range of motion in subjects with signs and symptoms of temporomandibular disorder: a systematic review of randomised controlled trials. *J Oral Rehabil*, 42 (11), 847-861. doi: 10.1111/joor.12321.

Campos, J. A. D. B., et al. (2014). Epidemiology of severity of temporomandibular disorders in brazilian women. *J Oral Facial Pain Headache*. 28 (2), 147–152. doi: 10.11607/ofph.1194.

Campos, J. A. D. B., et al. (2009). Reliability of a questionnaire for diagnosing the severity of temporomandibular disorder. *Rev Bras Fisioter*, 13(1), 38–43. Retrievet from: https://pdfs.semanticscholar.org/e94b/d6a9961dab47eaa74044847a254032bb8bb4.pdf.

Carmeli, E., et al. (2001) Comparative study of repositioning splint therapy and passive Manual Range of Motion Techniques for Anterior Displaced Temporomandibular discs with unstable excursive reduction. *Physiotherapy*, 87 (1), 26-36. doi: 10.1016/S0031-9406: 61189-3.

Craane, C., et al. (2012). Effects of Mindfulness-Based Cognitive Therapy on Specificity of Life Goals. *Cognit Ther Res*, 36(3), 182–189. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3348486/.

Cuccia A.M., et al (2010). Osteopathic manual therapy versus conventional conservative therapy in the treatment of temporomandibular disorders: A randomized controlled trial. *J Bodyw Mov Ther*, 14 (2), 179-184. Retrievet from: http://dx.doi.org/10.1016/j.jbmt.2009.08.002.

De Freitas, R. F. C. P., et al. (2013). Counselling and self-management therapies for temporomandibular disorders: A systematic review. *J Oral Rehabil*, 40 (11), 864-874. doi: 10.1111/joor.12098.

De Laat, A., et al. (2003). Counseling and physical therapy as treatment for myofascial pain of the masticatory system. *J Orofac Pain*., 17(1), 42-49. Retrievet from: https://pubmed.ncbi.nlm.nih.gov/12756930/

Fricton, J. R., et al. (2010). Critical appraisal of methods used in randomized controlled trials of treatments for temporomandibular disorders. *J Orofac Pain*, 24(2), 139-151. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4545283/.

Gil-Martínez, A., et al. (2018). Management of pain in patients with temporomandibular disorder (TMD): challenges and solutions. *J Pain Res*, 11, 571–587. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5859913/.

Gomes, C. A. F. D. P., et al (2014). Effects of massage therapy and occlusal splint therapy on mandibular range of motion in individuals with temporomandibular disorder: a randomized. *J Manipulative Physiol Ther*, 37(3), 164-169. doi: 10.1016/j.jmpt.2013.12.007.

Guarda-Nardini, L., et al. (2012). Myofascial pain of the jaw muscles: comparison of Short-term effectiveness of botulinum toxin injections and fascial manipulation technique. *Cranio*., 30 (2), 95-102. doi: 10.1179/crn.2012.014.

Jadad, A. R., et al (1996). Assessing the quality of reports of randomized clinical trials: Is blinding necessary? *Control Clin Trials*, 17(1), 1–12. Doi: 10.1016/0197-2456(95)00134-4.

Kalamir, A., et al. (2010). Pollard H, Vitiello A, et al. Intra-oral myofascial therapy for chronic myogenous temporomandibular disorders: a randomized, controlled pilot study. *J Man Manip Ther*, 18(3), 139–146. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3109684/.

Kalamir, A., et al. (2012). Intraoral myofascial therapy for chronic myogenous temporomandibular disorder: A randomized controlled trial. *J Manipulative Physiol Ther*, 35(1), 26-37. doi: 10.1016/j.jmpt.2011.09.004.

Kalamir, A., et al. (2013). Intra-oral myofascial therapy versus education and self-care in the treatment of chronic, myogenous temporomandibular disorder: A randomised, clinical trial. *Chiropr Man Therap*. 21(17), 1-10. Retrievet from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3706243/.

Maluf, A. S., et al. (2008). Therapeutic exercise in temporomandibular disorders: a review of literature. *Fisioterapia e Pesquisa*, 15(4), 408-415. Retrievet from https://www.scielo.br/scielo.php?pid=S180929502008000400016&script=sci_artte xt&tlng=en.

Manfredini, D., & Guarda-Nardini, L. (2010). *Botulinum toxin in the treatment of bruxism*. In: Paesani DA, ed. Bruxism: theory and practice. Berlin: Quintessence Publishing.

Michelotti, A., et al. (2005). Home-exercise regimes for the management of non-specific temporomandibular disorders. *J Oral Rehabil*. 2005; 32, 779–785. doi: 10.1111/j.1365-2842.2005.01513.x.

Oral, K., et al. (2009). Etiology of temporomandibular disorders pain. *Agri Gene*, 21(3), 89-94. Retrievet from: http://www.journalagent.com/agri/pdfs/AGRI_21_3_89_94.pdf .

Paesani, D. A., & Cifuentes, F (2010). *Clinical treatment of bruxism*. In: Paesani, D. A., ed. Bruxism: theory and practice. Berlin: Quintessence Publishing.

Packer, A. C., et al. (2014). Effects of upper thoracic manipulation on pressure pain sensitivity in women with temporomandibular disorder: a randomized, double-blind, clinical trial. *Am J Phys Med Rehabil,* 93(2), 160-168. doi: 10.1097/PHM.0000000000000031.

Packer, A. C., et al. (2015). Effect of upper thoracic manipulation on mouth opening and electromyographic activity of masticatory muscles in women with temporomandibular disorder: a randomized clinical trial. *J Manipulative Physiol Ther*, 38(4),1-9. doi: 10.1016/j.jmpt.2015.04.001.

Paulino, M. R., et al. (2018). Prevalence of signs and symptoms of temporomandibular disorders in college preparatory students: associations with emotional factors, parafunctional habits, and impact on quality of life. *Ciên Saude Colet*, 23(1),173-186. Retrievet from: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232018000100173&lng=pt&tlng=pt.

Schulz, K. F., et al. (1995). Empirical evidence of bias: Dimensions of methodological quality associated with estimates of treatment effect in controlled clinical trials. JAMA. 273(5):408–412. doi: 10.1001/jama.273.5.408.

Stecco, L. (2004). *Fascial Manipulation for musculoskeletal pain*. Padova: Piccin.

Veiga, D. M., et al. (2013). Sleep quality in patients with temporomandibular disorder : a systematic review. *Sleep Sci Pract*, 6(3), 120-124. Retrievet from:

http://www.sleepscience.org.br/details/19/en-US/sleep-quality-in-patients-with-temporomandibular-disorder--a-systematic-review.

Whitney, C. W., & Von Korff, M. (1992). Regression to the mean in treated versus untreated chronic pain. *Pain*, 50(3), 281–285. doi: 10.1016/0304-3959(92)90032-7.

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