

**Effectiveness of manual physical therapy and /or mandibular exercises in the treatment
of the articular temporomandibular disorder - a systematic review**

**Eficácia da fisioterapia manual e/ou exercícios mandibulares no tratamento da
disfunção temporomandibular articular - uma revisão sistemática**

**Efectividad de la terapia física manual y /o ejercicios mandibulares en el tratamiento del
trastorno temporomandibular articular - revisión sistemática**

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Abstract

Objective: Evaluate the effectiveness of manual therapy and exercises for improving function and/or pain in patients diagnosed with temporomandibular joint dysfunction (TMD) through a systematic review of the literature. **Methods:** A systematic and manual electronic search of the data was performed in the following databases: MEDLINE-Pubmed, Cochrane Library, Web of Science and Scopus (until 2020). The following descriptors were used: "physiotherapy", "physiotherapy modalities", "physiotherapy specialty", "manual therapy", "massage", "exercise", "temporomandibular joint", "temporomandibular disorder", "temporomandibular joint", "disc ", " Previous Disc Displacement ", " Randomized Controlled Clinical Trial ", " Controlled Clinical Trial ", " Effectiveness ", " Effect "and" Effectiveness ". As an inclusion, studies should present patients with joint pain diagnosed by the Diagnostic Criteria for Research on TMD (RDC / TMD) and manual therapy as an intervention. **Results:** Only 1 randomized controlled clinical trial was included in the inclusion criteria. Physical therapy manual exercises, despite promoting significant improvement in all studied variables, did not represent an additional positive effect in relation to the instruction and guidance given to patients with unrestricted articular disc displacement. Manual physical therapy and physical therapy exercises, despite while promoted a significant improvement in all the studied variables, did not represent an additional positive effect in relation to the instruction and orientation given to patients with joint disc displacement without reduction. **Conclusions:** Weak supporting evidence regarding the use of these approaches in patients with joint TMD was found, revealing the need to conduct new studies with methodologies well delineated and higher level of evidence.

Keywords: Temporomandibular dysfunction; Joint TMD; Physiotherapy; Manual therapy.

Resumo

Objetivo: avaliar a eficácia da fisioterapia para melhora da função em pacientes com diagnóstico de disfunção temporomandibular (DTM) do tipo articular e dor através de uma revisão sistemática da literatura. **Metodologia:** Foi realizada uma busca eletrônica sistemática e manual dos dados nas seguintes bases de dados: MEDLINE-Pubmed, Biblioteca Cochrane, Web of Science e Scopus (até 2020). Foram utilizados os seguintes descritores: “fisioterapia”, “modalidades fisioterapêuticas”, “especialidade fisioterapêutica”, “terapia manual”, “massagem”, “exercício”, “articulação temporomandibular”, “desordem temporomandibular”, “articulação temporomandibular”, “disco ”, “ Deslocamento de Disco Prévio ”, “ Ensaio Clínico Controlado Aleatório ”, “ Ensaio Clínico Controlado ”, “ Eficácia ”, “Efeito ”e “ Eficácia ”.

Como inclusão, os estudos deveriam apresentar pacientes com dor articular diagnosticados pelo Critério de Diagnóstico para Pesquisa em DTM (RDC / TMD) e terapia manual como uma intervenção. Resultados: Apenas 1 ensaio clínico controlado randomizado foi incluído nos critérios de inclusão. Os exercícios manuais de fisioterapia, apesar de promoverem melhora significativa em todas as variáveis estudadas, não representaram efeito positivo adicional em relação à instrução e orientação dada aos pacientes com deslocamento de disco articular sem redução. Conclusão: Evidências de apoio fracas sobre o uso dessas abordagens em pacientes com DTM articular foram encontradas, revelando a necessidade de realizar novos estudos com metodologias bem delineadas e com maior nível de evidência.

Palavras-chave: Disfunção temporomandibular; DTM articular; Fisioterapia; Terapia manual.

Resumen

Objetivo: evaluar la efectividad de la fisioterapia para mejorar la función en pacientes diagnosticados de trastorno temporomandibular (TTM) articular y dolor a través de una revisión sistemática de la literatura. Metodología: Se realizó una búsqueda electrónica sistemática y manual de datos en las siguientes bases de datos: MEDLINE-Pubmed, Cochrane Library, Web of Science y Scopus (hasta 2020). Se utilizaron los siguientes descriptores: "fisioterapia", "modalidades de fisioterapia", "especialidad de fisioterapia", "terapia manual", "masaje", "ejercicio", "articulación temporomandibular", "trastorno temporomandibular", "articulación temporomandibular", "disco", "Desplazamiento de disco anterior", "Ensayo clínico controlado aleatorio", "Ensayo clínico controlado", "Efectividad", "Efecto", "y", "Efectividad". Como inclusión, los estudios deben presentar a pacientes con dolor articular diagnosticado por los Criterios de Diagnóstico para la Investigación de TMD (RDC / TMD) y la terapia manual como una intervención. Resultados: Solo se incluyó 1 ensayo clínico controlado aleatorizado en los criterios de inclusión. Los ejercicios manuales de fisioterapia, a pesar de promover una mejoría significativa en todas las variables estudiadas, no supusieron un efecto positivo adicional en relación a la instrucción y orientación brindada a los pacientes con desplazamiento irrestricto del disco articular. Conclusión: Se encontró evidencia de apoyo débil sobre el uso de estos abordajes en pacientes con TTM articular, lo que revela la necesidad de realizar más estudios con metodologías bien diseñadas y con un mayor nivel de evidencia.

Palabras clave: Disfunción temporomandibular; DTM articular; Fisioterapia; Terapia manual.

1. Introduction

The temporomandibular joint (TMJ) can be affected by several disorders, for which this abnormality is called the temporomandibular disorder (TMD) nomenclature, masticatory muscles, and occlusion (Nascimento, et al., 2013; Craane, et al., 2012; Michelotti, et al., 2015; Cuccia et al., 2010). Biological, anatomical, biomechanical, behavioral, environmental and emotional factors are able to affect the masticatory system, collaborating to the time of symptomatology, due to favoring the appearance of signs and symptoms. This has led to the acceptance of the TMD as a multifactorial pathology (Nascimento, et al., 2013; Craane, et al., 2012; Tuncer, et al., 2012), characterized mainly by pain and restriction of mandibular movements, the symptom most often leads the patient to seek help is pain (Tuncer, et al., 2013; Nicolakis, et al., 2000). The TMD also impose a noteworthy problem of public health, affecting ~ 5-12% of the population and with pain playing a significant role on influencing people's personal quality of life and presenting a psychosocial effect on their daily activities (Armijo-Olivo, et al., 2016; Schiffman, et al., 2014).

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) widely used for TMD research since its publication in 1992 (Schiffman, et al., 2014; Workshop I, 1994). 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 (Schiffman, et al., 2014; Stegenga, 2010).

The main differences between the RDC / TMD and the DC / TMD are: in the DC / TMD there is a concern to reproduce the main complaint during the physical examination and the familiarity of the pain. Another point is related to the presence of pain during function and referred pain. Regarding diagnoses, in the RDC / TMD there are the following classifications: myofascial pain with or without opening limitation and in the DC / TMD the diagnoses are myofascial pain or referred myofascial pain. In addition, the muscle groups to be palpated were reduced, excluding palpation at intraoral sites (Schiffman, et al., 2014).

Currently, there is a lack of a consensus among researchers and the best treatment of this dysfunction remains unclear, with a common approach being the use of several concomitant therapies to obtain improvement in the clinical picture, which confuses the clinician about the most effective treatment (Cuccia, et al., 2010; Carmeli, et al., 2001; Medlicott, et al., 2006). The therapeutic methods described in the literature for these disorders includes physiotherapy,

occlusal splint, biofeedback, pharmacotherapy, transcutaneous electrical nerve stimulation, psychological therapy, use of botulinum toxin and surgery for joint disorders (Nascimento, et al., 2013; Zhang, et al., 2016). In patients with TMD no modality is considered to be better than the other. However, reversible therapies, such as physiotherapy, occlusal devices (occlusal splint), pharmacotherapy, occlusal splints, psychotherapy and osteopathy, are indicated as therapies with greater relief on the sematology of patients with TMD, being first-rate treatment options. (Michelotti, et al., 2005; Cuccia, et al., 2010).

Among the reversible methods mentioned, some authors consider physiotherapy to be effective for most TMD patients, especially in reducing joint pain, inflammation and limitation of mandibular movements (Nascimento, et al., 2013; Michelotti, et al., 2005; Cuccia, et al., 2010). Studies indicate that manual therapies together despite the low validation of the efficacy of physiotherapy treatment (Craane, et al. 2012), when compared to occlusal splint, active physiotherapy exercises show a greater reduction in TMD symptoms (Nascimento, et al., 2013; Craane, et al., 2012; Medlicott & Harris, 2006; Kalamir, et al., 2012).

Physiotherapy is among the ten most commonly used treatments for reducing localized pain in the neck and jaw and improving the extent of joint movement (Armijo-Olivo, et al., 2016). Therefore, physiotherapist are commonly involved in the TMD treatment together with dentists in the multidisciplinary intervention of 10% to 17% of the patients (Nascimento, et al., 2013; Craane, et al., 2012; Nicolakis, et al., 2000). This must be related to their peculiarities of being reversible, simple, non-invasive and lowcost if compared to other conservative therapies. In addition, they allow self-care, as the patient actively participates in their treatment, being the protagonist in their process of improvement. (Michelotti, et al., 2005). Although there are clinical studies that show its effectiveness, the demonstration of its effectiveness is difficult because of the fact that the methodologies of these studies are scientifically weak. Among the methodological problems found, we can mention: physical therapy to be performed with other treatments, absence of a control group, lack of clarification of which TMJ diagnostic group was treated and small samples analyzed. (Nicolakis, et al., 2000; Carmeli, et al., 2001).

In this context, the present article aimed to evaluate the effectiveness of manual therapy and exercises in improving function and /or pain in patients diagnosed with temporomandibular joint dysfunction, through a systematic review.

2. Methods

The methodology used for systematic review was chosen because it is a valuable resource that can highlight best practices in the health field and clarify clinical controversies. In addition, being a collection of high level evidence to answer a research question, based on structured protocols to detect relevant and reliable studies, this type of review is identified with the most rigorous. (Gupta, et al., 2018). Fitting as the appropriate methodology to answer the question of this article.

An electronic search was performed in the following databases: MEDLINE-Pubmed, The Cochrane Library, Web of Science and Scopus by 3 independent examiners to identify studies that assessed the effectiveness of manual therapies, massages or physical therapy exercises in the treatment of joint TMDs published until 2020. Studies written in English, Portuguese or Spanish were considered, using the combination of terms given in Table 01. The last study included was performed on April 23, 2018.

All abstracts found were read to determine if they met the eligibility criteria. The following inclusion criteria were considered:

- Be a randomized controlled trial.
- Evaluation of patients (adolescent, adult or elderly) diagnosed with joint pain performed by the RDC / TMD or DC/TMD;
- Presence of at least 1 type of intervention in which manual therapy was applied alone. In this treatment would include: thermal agents, massages in the main muscles responsible for mastication and therapeutic exercises, such as coordination and stretching exercises.
- Presence of at least one control group in which patients were treated with a different therapy such as medication, guidelines / counseling, occlusal plints.

Exclusion criteria were those studies in which RDC/TMD or DC/TMD was not used as a diagnostic criterion, or those in which intervention groups other than those previously mentioned in the inclusion criteria were instituted.

The descriptors used were: “Physical therapy”, “Physical therapy modalities”, “Physical therapy specialty”, “Manual therapy”, “Massage”, “Exercise”, “Temporomandibular joint”, “Temporomandibular joint disorders”, “Temporomandibular joint disc”, " Previous disc

displacement "," Randomized controlled trial "," Controlled Clinical Trial "," Effectiveness "," Effect "and" Efficacy ". Which are shown in Table 1:

Table 1 - Eletronic search strategy for databases.

	(Physical therapy* OR Physical therapy modalities* OR Physical therapy specialty)
	AND
	(Manual therapy* OR Massage* OR Exercise*)
	AND
Medline-PubMED	
Web of Science	(Temporomandibular Joint* OR Temporomandibular joint disorders* OR Temporomandibular joint disc* OR Anterior disc displacement*)
Cochrane Library	
Scopus	
	AND
	(Randomized controlled trial* OR Controlled Clinical Trial*)
	AND
	(Effectiveness* OR Effect* OR Efficacy*)

Source: Bibliographic search. 00Natal (2020).

Which summarizes how the combination of keywords in each database took place. After reading the titles and abstracts, the relevant studies were selected, obeying the inclusion and exclusion criteria mentioned above. Repeated articles were deleted. Data were obtained from all selected articles including the following parameters: authors of the article, study design, sample (size, gender and age), treatment groups (with physiotherapy and control), follow-up and results. Faced with disagreement among the evaluators, the full texts were read and a fourth researcher was required to evaluate and decide whether or not to include the article.

This study used the attributions of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher, et al., 2009). for systematic reviews with the purpose of evaluating the efficiency of physical therapy through manual therapy and exercises in improving the function and/or pain in patients diagnosed with temporomandibular joint dysfunction. The restriction to these types of physiotherapeutic approaches was intended to facilitate understanding, giving a specific response to health professionals interested in the topic.

3. Results and Discussion

The final electronic search in the databases already mentioned using the search strategy with descriptors mentioned in table 1 resulted in 88 articles. 38 articles were removed as they were duplicate articles and the first number was then reduced to 48 studies, which after reading the titles and abstracts, a total of 09 articles were selected for full reading. Of these, eight articles were excluded, as shown in Table 2.

Table 2 – Exclusion criteria and excluded articles.

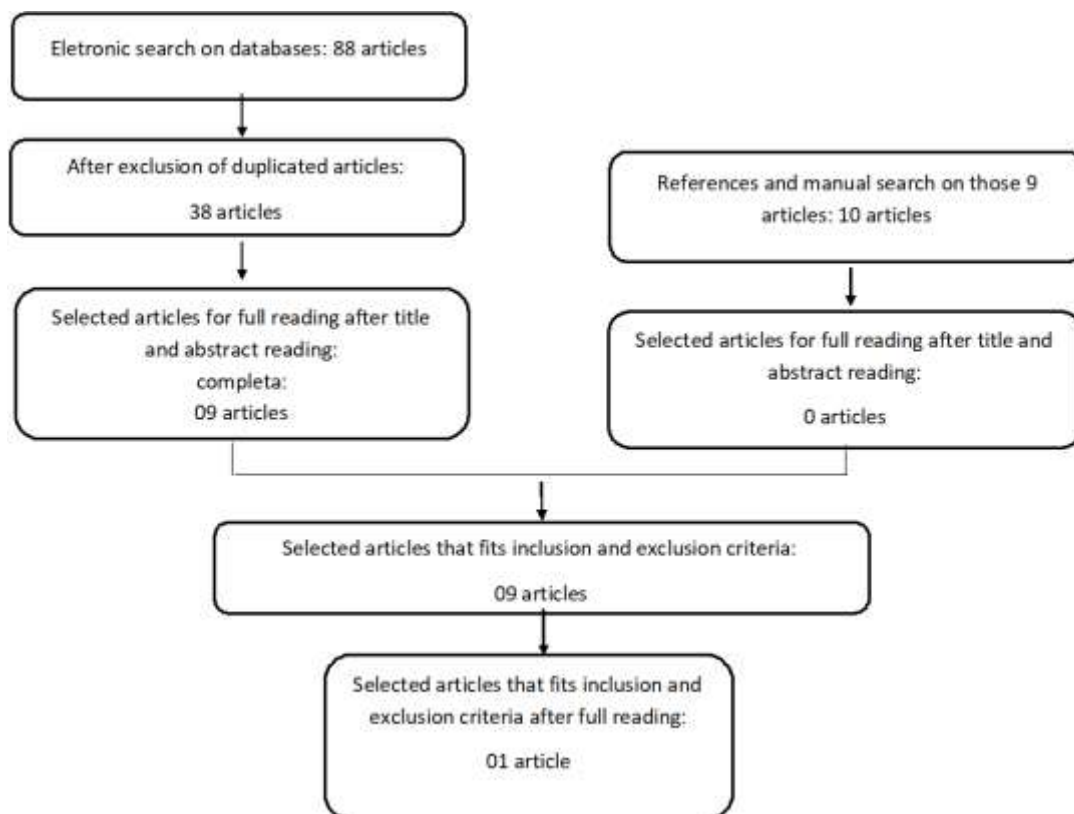
Exclusion criteria	Excluded articles (n=8)
Did not use RDC/TMD	Haketa T, et al. 2010 Cuccia AM, et al. 2009
It is not a ECR	Nicolakis P, et al. 2000 Michelotti A, et al. 2005
No exclusive group of joint dysfunction	Tuncer AB. 2012 Melo TA, et al. 2020
Other therapies associated with physioraphy	Nascimento MM. 2013 Resende CMBM. 2019

Source: Bibliographic search in Medline-PubMED, Web of Science, Cochrane Library, Scopus. Natal (2020).

Table 2 explains why the eight articles were excluded, in which: : non-use of RDC / TMD as diagnostic criterion (n = 2) were not randomized clinical trials (n = 2), absence of a group exclusively for joint TMD (n = 2), other therapies associated with physiotherapy (n = 2), as described in Table 2. A manual search was made in the bibliography of these articles with no article being selected. Therefore, only one article that included the established inclusion and exclusion criteria was found.

Details on the search strategy are described in the flowchart form in Figure 1.

Figure 1 - Flowchart with search strategy and results.



Source: Natal (2020)

The main aspects and results of the selected article are shown in table 3:

Table 3- Final resulto of systematic review.

Study	Study Design	Sample	Variables	Follow-up	Results
Craane et al	Randomized clinical trial	49 patients distributed in 2 groups. Physiotherapy and counseling: Patients received physiotherapeutic treatment by trained professionals and received guidance regarding the normal function of the mandible and that it excessive use, misuse or parafunction could cause an increase in symptoms. They were instructed to keep the jaw muscles relaxed and avoid excessive dental contact and exaggerated opening of the mouth. Control: Only the guidelines mentioned above have been carried out.	Age, gender, pain intensity, active mouth opening, passive mouth opening, pressure thershold (masseter and temporal) and mandibular function.	52 weeks	For all outcome variables, there was a significant improvement over time, regardless of the therapy applied.

Source: Craane, et al. (2012).

In the present study, shown in table 3, a randomized controlled clinical trial of manual therapies, massages and physical therapy exercises in the treatment of joint TMDs. 49 patients

fulfilled all inclusion criteria, and they were then, divided into two groups: physiotherapy (23 patients with mean age of 34.7 years) and control (26 patients with mean age of 38.5 years). In the article in question, patients who presented a positive diagnosis for TMD through the RDC / TMD examination and reported pain measured through visual pain scale (VAS) were included. Patients reporting trauma, systemic, cervical and neurological disorders, abusive use of drugs and / or alcohol, use of antidepressive and hormonal medications, and that have received treatment for TMD in the last 2 months were excluded. The researchers performed baseline assessments and at 3, 6, 12, 26, and 52 weeks. All patients received guidance regarding the normal function of the mandible and that it excessive use, misuse or parafunction could cause an increase in symptoms. They were instructed to keep the jaw muscles relaxed and avoid excessive dental contact and exaggerated mouth opening. Patients received a booklet with guidance to review at home. The patients assigned to the physiotherapy treatment group had 9 sessions for a period of 6 weeks.

The selected article, analyzed the efficiency of manual mobilization, exercises and massage in active and passive mouth opening, pressure threshold (masseter and temporal), mandibular function and reduction of pain intensity, showing significant improvement over time in all these variables (Craane, et al., 2012).

This study demonstrated that manual therapy had no additive effect on the control group, however, the results show that a significant positive effect was detected in the approach of information and instructions for patients with TMD, being therefore efficient. One of the limitations of the study was that patients with muscle pain concomitant with joint problems were not considered to be part of the exclusion criterion, which leads to the same question of the impossibility of evaluating the efficacy of physical therapy for each subtype of TMD, articular and muscular.

There is no consensus on the best treatment for joint TMD between the authors, which makes the conservative clinical approach more difficult. The large number of therapeutic approaches reported in the literature is a result of the multifactorial etiology that involves this pathology (Nascimento, et al., 2013; Craane, et al., 2012; Tuncer, et al., 2012).

The literature search presented few randomized controlled clinical trials. Some studies did not present a well-defined design, such as Tuncer, et al. (2012), in which study groups were did not distinguished which subtypes of TMD (muscular or articular) were present in each one, making it impossible to evaluate the efficacy of the physiotherapy for each subtype.

However, despite not specifying the TMD subtype, this study demonstrated that physiotherapy approaches, whether performed by the individual alone or in conjunction with a

professional manual approach, achieved, in a period of 4 weeks, effects in reducing pain and improving function (Tuncer, et al., 2013). Another study, in which manual therapy was performed after analgesia with low-level laser therapy, showed a balance in the orofacial functions of the studied sample and a reduction in the remaining TMD signs and symptoms, according to the improved function, visual analog scale (VAS) and the self-assessment of the treated individuals (Melchior, et al., 2016).

Another factor that prevented a more reliable assessment of the therapeutic role of exercises, massages and manual therapies in joint TMDs was the frequent association of physiotherapy with other treatments, such as anesthetic block (Nascimento, et al., 2013) or use of anti-inflammatory drugs (Yuasa, et al., 2001) in the control group of the dysfunction, that way generating uncertainty about the real contribution of the physiotherapeutic scheme applied alone. And so that it is possible to establish a conservative and effective treatment plan for patients associated with temporomandibular joint dysfunction, reducing the number of patient visits for treatment and improving the quality of life (Pelicioli, et al., 2017; Locker & Grushka, 1987).

In 1992 a diagnostic criteria was published with the aim of standardizing the diagnose in the area of orofacial pain and dysfunction for research purposes, RDC / TMD (research diagnostic criteria for temporomandibular disorders) (Anderson et al., 2017). The non-standardization of the diagnostic criteria was a contributing factor for the low number of articles selected, as seen in the studies by Cuccia, et al. (2009) that used the temporomandibular index and magnetic resonance imaging as diagnostic method, respectively.

The RDC / TMD and more recently the DC / TMD are important tools used as a diagnostic criterion in TMD studies, as they are highly reliable in terms of diagnosis and still consist of a reproducible instrument, supporting its use in clinical investigations, research and decision making. for treatment modalities (Schiffman, et al., 2014; John, et al., 2005). Which should be used to verify the integrity and functional relationship of the TMJ components, to evaluate possible diseases, regarding their extension and progression and to monitor ongoing treatments, magnetic resonance can be used (Ferreira, et al., 2016).

The heterogeneity between the studies, mainly with regard to the diagnosis of TMD, lack of a specific group with only physical therapy and comparison of these with other treatments, randomized clinical studies, so, the diversity found in the studies, the small sample size and the low methodological quality of many of the studies, limit general conclusions and highlight the need for further research.

4. Conclusion

The present systematic review resulted in the analysis of a single study in which physiotherapeutic therapies of mandibular mobilization, mandibular exercises or massage promoted a significant improvement in all the variables studied independently of time, but did not represent an additional positive effect in relation to the instruction and orientation given to patients with full disc displacement without reduction. Given the limited number of well-delineated randomized clinical trials available on the efficacy of these physiotherapeutic approaches, the scientific evidence regarding the topic is considered to be weak. Finally, more studies with higher levels of evidence are needed to validate the use of these conservative approaches in the treatment of patients with joint TMD.

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