

# Manual Therapy in the Treatment of Myofascial Pain Related to Temporomandibular Disorders: A Systematic Review

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**Aims:** To evaluate the effectiveness of manual therapy in the treatment of myofascial pain related to temporomandibular disorders. **Methods:** Randomized clinical trials were searched in the Cochrane Library, MEDLINE, Web of Science, Scopus, LILACS, and SciELO databases using the following keywords: temporomandibular joint disorders; craniomandibular disorders; myofascial pain syndromes; myofascial pain; exercise therapy; myofunctional therapy; physical therapy modalities; clinical trial; prospective studies; and longitudinal studies. Studies using the RDC/TMD and manual therapy for myofascial pain were included. All studies were evaluated using the Cochrane Risk of Bias tool. **Results:** Five studies were included in the present review. Of 279 total patients, 156 were treated with manual therapy only or manual therapy with counseling. Manual therapy was efficient for pain relief in all studies evaluated; however, manual therapy was not better than counseling or botulinum toxin. **Conclusion:** Manual therapy was better than no treatment in one study and better than counseling in another study; however, manual therapy combined with counseling was not statistically better than counseling alone, and manual therapy alone was not better than botulinum toxin. Manual therapy combined with home therapy was better than home therapy alone in one study. Further studies are required due to the inconclusive data and poor homogeneity found in this review. *J Oral Facial Pain Headache 2020;34:141–148. doi: 10.11607/ofph.2530*

**Keywords:** *exercise therapy, myofascial pain, myofascial pain syndromes, systematic review, temporomandibular joint disorders*

Myofascial pain in masticatory muscles is the most common form of temporomandibular disorder (TMD) reported in the literature. According to Guarda-Nardini et al (2012), this disorder is responsible for more than half of the cases treated in clinics worldwide.<sup>1</sup> Its treatment is a challenge for clinicians due to its multifactorial etiology and the large number of therapeutic approaches described in the literature. Among the most common therapies for myofascial pain are physical and manual therapies, muscle relaxants, occlusal devices, counseling and behavioral therapies, acupuncture, and botulinum toxin injections.<sup>2</sup>

Conservative and noninvasive treatments are generally recommended for the initial treatment of TMD, as they are efficient in reducing painful symptoms and bringing comfort to the patient.<sup>3</sup> As a result of those advantages, manual therapy is addressed in the literature as a viable therapeutic option. Furthermore, this therapy is also responsible for restoring normal function.<sup>4</sup>

Manual therapy is a specialized area within the field of physical therapy commonly used to treat spinal symptoms and has been applied in the treatment of TMD. For the treatment of these conditions, manual therapy includes mobilization of the temporomandibular joint (TMJ) and soft tissues of sore muscles, passive or active stretching exercises, gentle isometric tension against resistance exercises, and guided opening and closing of mandibular movements.<sup>5</sup>

Over the years, manual therapy has been the subject of many studies in the literature. However, due to the variability and methodologic limitations of published studies—such as the combination of this therapy with other types of treatment, the absence of a control group, the

**Table 1 Search Strategies for the Study Databases**

Database	Strategy
MEDLINE	((“Temporomandibular Joint Disorders”[Mesh] OR “Craniomandibular Disorders”[Mesh]) AND (“Myofascial Pain Syndromes”[Mesh] OR “Myofascial Pain”) AND (“Exercise Therapy”[Mesh] OR “Myofunctional Therapy”[Mesh] OR “Physical Therapy Modalities”[Mesh]) AND (“Clinical Trial”[Publication Type] OR “Prospective Studies”[Mesh] OR “Longitudinal Studies”[Mesh]))
Web of Science	TS=(“Temporomandibular Joint Disorders” OR “Craniomandibular Disorders”) AND TS=(“Myofascial pain” OR “Myofascial Pain Syndromes”) AND TS=(“Exercise Therapy” OR “Myofunctional Therapy” OR “Physical Therapy Modalities”)
Cochrane Library	“Temporomandibular Joint Disorders” OR “Craniomandibular Disorders” and “Myofascial pain” OR “Myofascial Pain Syndromes” and “Exercise Therapy” OR “Myofunctional Therapy” OR “Physical Therapy Modalities” and “Clinical Trial” OR “Prospective Studies” OR “Longitudinal Studies”
Scopus	(ALL (“Temporomandibular Joint Disorders” OR “Craniomandibular Disorders”) AND ALL (“Myofascial Pain Syndromes” OR “myofascial pain”) AND ALL (“Exercise Therapy” OR “Myofunctional Therapy” OR “Physical Therapy Modalities”) AND ALL (“Clinical Trial” OR “Prospective Studies” OR “Longitudinal Studies”))
LILACS	“Temporomandibular Joint Disorders” OR “Craniomandibular Disorders” and “Myofascial pain” OR “Myofascial Pain Syndromes” and “Exercise Therapy” OR “Myofunctional Therapy” OR “Physical Therapy Modalities” and “Clinical Trial” OR “Prospective Studies” OR “Longitudinal Studies”
SciELO	“Temporomandibular Joint Disorders” OR “Craniomandibular Disorders” and “Myofascial pain” OR “Myofascial Pain Syndromes” and “Exercise Therapy” OR “Myofunctional Therapy” OR “Physical Therapy Modalities” and “Clinical Trial” OR “Prospective Studies” OR “Longitudinal Studies”

use of different diagnostic criteria for TMD, and lack of standardized diagnosis<sup>6</sup> and homogeneity in the type of TMD being treated—the scientific evidence is lacking. Considering these limitations, some results are limited and nonreproducible for the treatment of myofascial pain, making it difficult to apply this therapeutic modality in the dental clinic. Therefore, this paper, through a systematic literature review of controlled and randomized clinical trials, aimed to evaluate the effectiveness of manual therapy in the treatment of myofascial pain related to TMD.

## Materials and Methods

This review followed the recommendations of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)<sup>7</sup> checklist. The question intended to be answered was: Is manual therapy efficient in treating patients with TMD-related myofascial pain?

### Eligibility Criteria

Controlled and randomized trials that met the following criteria were included:

- Evaluation of adolescents, adults, or elderly patients with diagnosis of myofascial pain according to the Research Diagnostic Criteria for TMD (RDC/TMD) questionnaire
- Presence of at least one intervention group in which manual therapy—such as mobilization of the TMJ and/or soft tissues of the muscles,

passive or active stretching exercises, gentle isometric tension against resistance exercises, guided opening and closing of the mandibular movements, and/or massage—was applied

- Presence of at least one control group under some other type of treatment (medicines, physical therapy, guidelines/counseling, occlusal devices) or absence of intervention

The following studies were excluded: studies in which TMJ changes were the variable of interest; in which patients presented headache associated with myofascial pain or were diagnosed for TMD by an instrument other than the RDC/TMD; in which patients were diagnosed with myofascial pain associated with pain of neurogenic origin; and in which treatment in the test group was given in association with medications and physiotherapy.

### Search Strategies

The electronic search strategies were conducted by three researchers (A.K.B.M.; L.A.M.; M.F.T. P.C.) independently from February to April 2019 in the Cochrane Library, MEDLINE, Web of Science, Scopus, LILACS, and SciELO databases using the following descriptors: myofascial pain syndromes; myofascial pain; exercise therapy; myofunctional therapy; physical therapy modalities; clinical trial; prospective studies; and longitudinal studies. The strategy using these descriptors was suitable for each type of database (Table 1).

In addition to the electronic search, references of original articles, potential systematic reviews, and controlled clinical trials were checked.

## Selection of Studies and Data Collection

After searching the databases, the resulting titles and abstracts were organized using a standard form. Then, the three researchers, using the same eligibility criteria, selected studies with the potential to be read in full and included in the review.

Data from the studies read in full and included in the review were recorded on a data extraction sheet by the three researchers, who independently and in triplicate recorded the data referring to the study (sample, country where the study was performed, and age and sex distribution of patients). In addition, the diagnosis, intervention, and details of the control group, their follow-up, and their outcomes were also extracted.

In the presence of disagreements, the authors consulted a fourth author (C.M.B.M.R.) and through consensus reached a common decision.

## Risk of Bias Assessment

The Cochrane Risk of Bias tool evaluates six sources of bias: sequence generation; allocation concealment; masking/blinding of participants, personnel, and outcome assessors; incomplete outcome data; selective outcome reporting; and other potential sources of bias.<sup>8,9</sup> This tool was used to evaluate the quality of the studies included in this review, classifying each as having a low, unclear, or high risk of bias.

## Results

The electronic and manual search strategies resulted in 143 titles and abstracts. From these, 23 records were selected using the inclusion and exclusion criteria and read in their entirety.<sup>1,4,5,10-29</sup> At the end, 5 were elected to be included in the review (Fig 1). Excluded studies are shown in Table 2, and details of included studies in Table 3. Table 4 shows risk of bias results.

In the selected studies, a total of 279 individuals were evaluated, of ages varying from 12 to 69 years. Of these participants, 156 received manual therapy only or manual therapy with counseling. The other 123 individuals were in the control groups: 15 were treated with botulinum toxin injections, 20 with home physical therapy alone, 31 with no treatment, and 57 with counseling.

Overall, differences in myofascial pain and limitations of oral function were evaluated. Michelotti et al<sup>4</sup> conducted a randomized clinical trial comparing the efficacy of educational counseling only and manual therapies with counseling in the treatment of myofascial pain. In the group that received educational counseling only ( $n = 34$ ), the success rate in pain reduction was 57%, while the group receiving manual therapies and counseling ( $n = 36$ ) achieved a rate

**Table 2 Exclusion Criteria and Articles Excluded After Reading in Full**

### Did not use RDC/TMD for diagnosis ( $n = 10$ )

Greene and Laskin<sup>13</sup> (1974)  
Kraaijenga et al<sup>14</sup> (2014)  
Nicolakis et al<sup>15</sup> (2002)  
Oliveira-Campelo et al<sup>16</sup> (2010)  
Bae and Park<sup>17</sup> (2013)  
Gomes et al<sup>18</sup> (2014)  
Maluf et al<sup>19</sup> (2010)  
Talaat et al<sup>20</sup> (1986)  
Grace et al<sup>21</sup> (2002)  
Magnusson and Syrén<sup>22</sup> (1999)

### Written in a language other than English, Portuguese, or Spanish ( $n = 2$ )

van der Glas et al<sup>23</sup> (2000)  
Michelotti et al<sup>24</sup> (2000)

### Manual therapy associated with the use of medications ( $n = 2$ )

Carlson et al<sup>25</sup> (2001)  
Mulet et al<sup>26</sup> (2007)

### Chapter of book/clinical protocol or case-control study ( $n = 2$ )

Borg-Stein and Iaccarino<sup>27</sup> (2014)  
La Touche et al<sup>28</sup> (2009)

### Article repeated ( $n = 1$ )

Tuncer et al<sup>29</sup> (2013)

of 77%. Although numerically larger, indicating that education in combination with manual therapy was clinically more efficient than education alone for the treatment of myofascial pain, this difference was not statistically significant ( $P = .157$ ).

Kalamir et al<sup>10</sup> evaluated whether there were differences in myofascial pain treatment results when comparing individuals who received isolated manual therapies ( $n = 31$ ), manual therapies with counseling ( $n = 31$ ), or no treatment (control,  $n = 31$ ). For this, a randomized clinical trial was conducted. There were statistically significant differences ( $P < .05$ ) in pain reduction in both groups that received an intervention compared to the control at 6 months and 1 year of treatment. There were also significant differences ( $P = .016$ ) between the two treatment groups at 1 year, with greater pain reduction in the group that received manual therapies with counseling compared to the group that received manual therapy alone.

Another randomized trial also conducted by Kalamir et al<sup>11</sup> evaluated differences between manual therapies and short-term counseling in myofascial pain. Individuals who received manual therapies ( $n = 23$ ) had statistically significantly ( $P < .001$ ) better results in reducing myofascial pain when compared to the group receiving only counseling ( $n = 23$ ). Guarda-Nardini et al<sup>1</sup> compared the effectiveness of manual therapy to that of a single injection of botulinum toxin in the masseter and temporalis muscles for the reduction of myofascial pain. In their

**Table 3** Characteristics and Summary of the Results of the Included Studies

Study	Location	Groups	Intervention
Guarda-Nardini et al <sup>1</sup>	Italy	Group 1: Manual therapy	<i>Manual therapy:</i> In multiple sessions (3 sessions of 50 min/wk), deep digital pressure was applied to specific points selected according to precise clinical examination. Therapists used their elbows, wrists, or fingers to exert pressure on the selected muscle areas, following a guideline for facial manipulation. <sup>31</sup>
		Group 2: Botulinum toxin injections	<i>Botulinum toxin injections:</i> single-injection session of 150 U botulinum toxin for each side of the masseter and temporalis muscles, performed by the same operator (application technique based on Paesani and Cifuentes <sup>32</sup> and Manfredini and Guarda-Nardini <sup>33</sup> )
Michelotti et al <sup>4</sup>	Italy	Group 1: Counseling	<i>Counseling:</i> information on self-care of the masticatory muscles; explanation of the problem, possible etiology, and benign character; instructions to avoid parafunctional habits, excessive mandibular movement, maintain a soft diet, maintain relaxed position of the mandible without dental contact; explanation of the relationship between chronic pain and psychologic stress.
		Group 2: Manual therapy and counseling	<i>Manual therapy:</i> self-relaxation exercises with diaphragmatic breathing; self-massage of masticatory muscles (masseter and temporalis); application of moist heat pads on sore muscles (40–50°C for 10 min); stretching (open mouth slowly until the position where they begin to feel pain, hold position for 1 min, repeat movement 6 times every 2 hours, daily); and coordination exercises (open and close the mouth slowly 20 times, and during the movement maintain the midline parallel to a vertical line drawn in a small mirror). The massage was performed with circular movements performed with the index, middle, and ring fingers placed extraorally on the masseter area. The thumb was placed intraorally, and counterpressure was exerted during the massage. The temporal muscles were massaged by gentle rolling movements performed with the ipsilateral index, middle, and ring fingers.
Tuncer et al <sup>5</sup>	Turkey	Group 1: Manual therapy and home manual therapy	<i>Manual therapy</i> was performed by a professional and included mobilization of soft tissues (deep and extraoral massage of sore muscles), mobilization and stabilization of TMJ, coordination exercises, cervical spine mobilization, relaxation after isometric contraction, and stretching techniques for the masticatory muscles and neck. Each therapy lasted for at least 30 minutes, was 3 times/wk for 4 wks, and was individually adapted to the needs of each subject.
		Group 2: Home manual therapy	<i>Home physical therapy:</i> Education regarding the etiology of pain and ergonomics; guidelines for breathing exercises, relaxation techniques, and postural and mandibular correction exercises; repetitive stretching exercises, opening and closing of the mandible, medial and lateral slip, and resistance exercises.
Kalamir et al <sup>10</sup>	Australia	Group 1: Manual therapy	<i>Manual therapy:</i> intraoral relaxation of temporalis; intraoral technique of medial and lateral pterygoid (the finger is inserted along the lateral wall of the pharynx, posterior to the last molar, and the pressure is applied for 5 s to the tissues of the pharyngeal mucosa, overlying the insertions of the pterygoid origins). <i>Intraoral sphenopalatine ganglion technique:</i> The smallest finger of the therapist's hand is inserted along the buccal surface of the lightly occluded teeth. The patient is asked to temporarily clench their teeth, and upon relaxing, the practitioner progressively inserts their finger behind the lingual surface of the masseter and medial pterygoid until the tip of the finger comfortably reaches the anterior aspect of the infratemporal fossa/sphenopalatine fossa. Then, the patient is requested to lift their head off the table, pushing into the contact. At the end of 3 repetitions, the patient relaxes and rests their head back onto the headrest, and soft buccal pressure is exerted into the masseter and medial pterygoid muscles by the practitioner's fingertip before gently being removed from the mouth.
		Group 2: Manual therapy and counseling	
		Group 3: No treatment	<i>Counseling:</i> guidance on the condition; teaching supervised self-care exercises performed during the session with the professional to be performed by the patient twice a day. The exercises were guided and controlled mandibular excursions and stretching after isometric contractions (lateral deviation and opening).
Kalamir et al <sup>11</sup>	Australia	Group 1: Manual therapy	<i>Manual therapy:</i> intraoral relaxation of temporalis muscle; intraoral technique of the medial and lateral pterygoid (see Kalamir et al <sup>10</sup> ); intraoral sphenopalatine ganglion technique (see Kalamir et al <sup>10</sup> ).
		Group 2: Counseling	<i>Counseling:</i> See Kalamir et al. <sup>10</sup>

results, they found that both treatments improved pain levels and that manual therapy was slightly superior in reducing the perception of subjective pain. However, this difference was not statistically significant ( $P > .05$ ).

Finally, Tuncer et al<sup>5</sup> evaluated the effectiveness of manual therapy and compared it to home physical

therapy in patients with muscular TMD. These patients were divided into two groups. The first group ( $n = 20$ ) received guidelines regarding pain etiology, ergonomics, breathing exercises, relaxation techniques, postural correction exercises, mandibular exercises, repetitive stretching exercises, opening and closing, and resistance exercises. The other

Mean age of participants (y)	Sample size	Follow-up	Main results
Group 1: 43.2	Group 1: n = 15	3 mo	Both treatments improved pain levels, and facial manipulation was slightly superior in reducing the perception of subjective pain. However, this difference was not statistically significant ( $P > .05$ ).
Group 2: 47.7	Group 2: n = 15		
Group 1: 31.8	Group 1: n = 34	3 mo	The pain reduction success rate was 57% for group 1, while group 2 achieved a rate of 77%. Comparing the two groups, there was no statistically significant difference ( $P = .157$ ).
Group 2: 28.2	Group 2: n = 36		
Group 1: 37	Group 1: n = 20	4 wk	The effectiveness of the treatment used in the group that received manual therapy from the professional and performed home physical therapy was significantly higher for pain, both at rest and during stress, when compared to the group that received only guidelines and home physical therapy.
Group 2: 34.8	Group 2: n = 20		
Group 1: 34	Group 1: n = 31	6 mo and 1 y	There were statistically significant differences ( $P < .05$ ) in pain reduction in both groups receiving intervention compared to the untreated group at 6 mo and 1 y of follow-up. There were also significant differences ( $P = .016$ ) between the two groups who received treatment at 1 y, with greater pain reduction in group 2 than in group 1.
Group 2: 35	Group 2: n = 31		
Group 3: 35	Group 3: n = 31		
Group 1: 28.2	Group 1: n = 23	6 wk	Individuals who received manual therapies had statistically better results ( $P < .001$ ) in reducing myofascial pain when compared to the group receiving only counseling.
Group 2: 26.8	Group 2: n = 23		

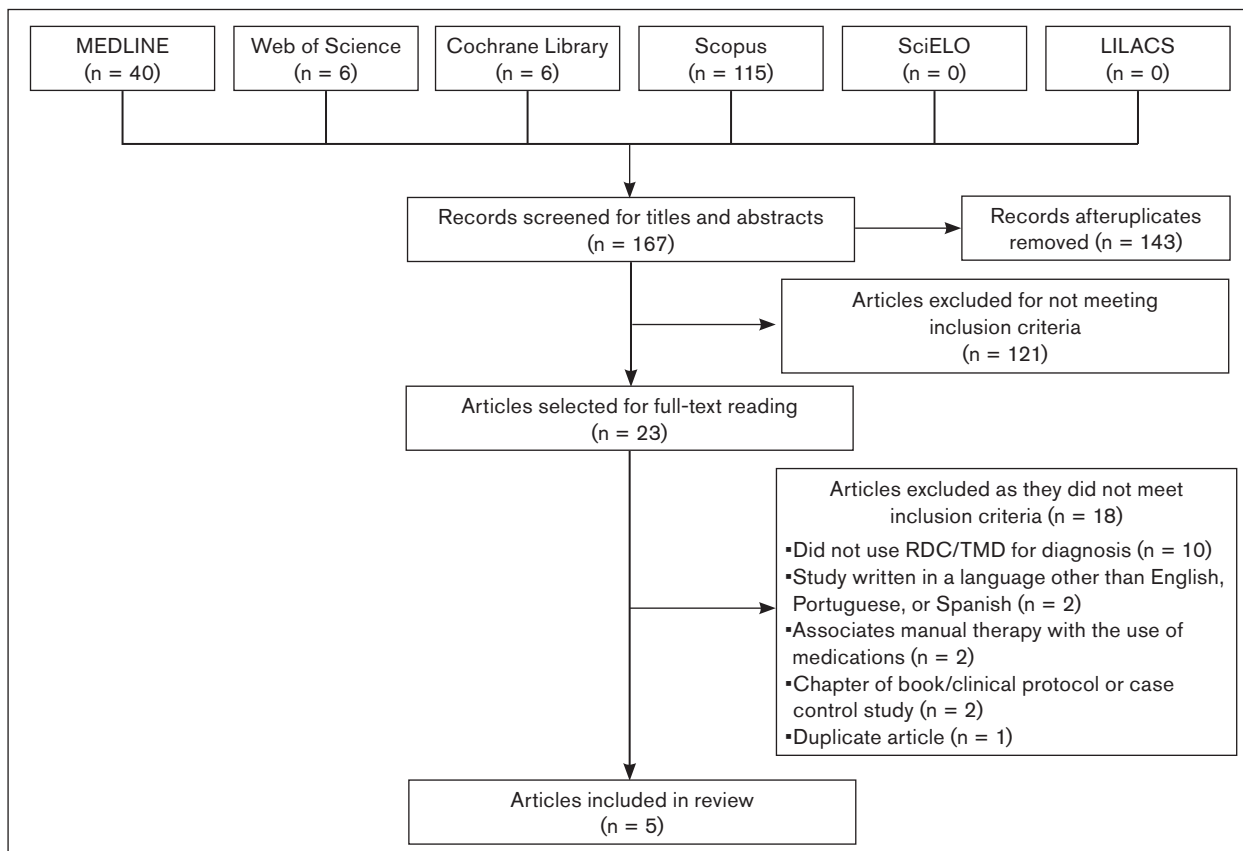
group (n = 20), in addition to these guidelines, received manual therapy from a specialist. In their results, the effectiveness of the treatment used in the group that received both guidelines and manual therapy was significantly higher for pain both at rest and during stress when compared to the group that received only the guidelines ( $P < .001$ ).

## Discussion

This study sought to gather scientific evidence to evaluate the effectiveness of manual therapy for the treatment of TMD-related myofascial pain. For this aim, only controlled and randomized trials, whose level of scientific evidence is high, were included.

**Table 4 Risk of Bias of Articles Selected for the Systematic Review**

Study	Sequence generation	Allocation concealment	Masking/blinding of participants, personnel	Masking/blinding of outcome assessors	Incomplete outcome data	Selective outcome reporting	Other potential sources of bias	Study classification
Guarda-Nardini et al <sup>1</sup>	Low	Low	Unclear	Low	Low	Low	Low	Unclear
Michelotti et al <sup>4</sup>	Unclear	Unclear	Low	Low	Low	Low	Low	Unclear
Tuncer et al <sup>5</sup>	Low	Unclear	Unclear	Unclear	Low	Low	Low	Unclear
Kalamir et al <sup>10</sup>	Low	Low	Unclear	Low	Low	Low	Low	Unclear
Kalamir et al <sup>11</sup>	Low	Low	Unclear	Low	Low	Low	Low	Unclear



**Fig 1** Study flowchart.

The included studies were also standardized using the RDC/TMD to ensure the validity, similarity, and reproducibility of the studies. Despite this measure, it was not possible to conduct a meta-analysis of the articles, since the studies were considerably heterogenous methodologically and because manual therapy was compared to different interventions (medications, physical therapy, and counseling). All five studies presented risk of bias, suggesting poor methodology; so, the differences in the experimental designs of those studies represent a significant challenge for comparison of the results.

Following the search strategies, a small number of randomized controlled clinical trials evaluating

the effectiveness of manual therapy for the treatment of TMD-related myofascial pain were selected. This fact demonstrates the low level of scientific evidence of most of the papers present in the literature. Additionally, all studies included in the review presented a dubious methodologic quality, since they presented a risk of uncertain bias (Table 4). This requires caution in the analysis and results.

The studies included several manual therapy techniques applied by the patient and/or by a specialized professional. They consisted mainly of self-relaxation exercises with diaphragmatic breathing, self-massage of the masticatory muscles (mainly masseter and temporalis), stretching, coordination

exercises, and intraoral massage techniques. In the papers of Kalamir et al,<sup>10,11</sup> Wahlund et al,<sup>12</sup> Guarda-Nardini et al,<sup>1</sup> and Tuncer et al,<sup>5</sup> therapy was instituted by a specialist and, in all cases, was efficient in reducing pain perception and improving mandibular function over time, ensuring better levels of openness.

However, the manual therapy was not better than educational counseling or botulinum toxin for pain relief in the studies of Michelotti et al<sup>4</sup> and Guarda-Nardini et al,<sup>1</sup> respectively. Although no superiority was found for manual therapy, it is a low cost, reversible, noninvasive, and efficient treatment for TMD pain. The frequent applications of botulinum toxin represent a high-cost treatment with statistically similar efficacy to manual therapy. It is noteworthy that both studies did not check if a longer treatment with manual therapy would change the results. So, additional studies evaluating those variables are required to compare manual therapy to botulinum toxin and educational counseling.

For educational counseling, it was observed in this review that the effectiveness of manual therapy was closely related to counseling techniques. Their effectiveness was noticeably higher when these two types of treatment were combined.<sup>5,10</sup> In some cases, no difference between the effectiveness of the two was verified.<sup>4</sup> This highlights the importance of talking to and guiding the patient during the treatment of myofascial pain. Thus, patient education and guidance play a significant role. Furthermore, increasing the patient's responsibility in addressing the psychosocial factors of the disease can be an important tool during treatment.<sup>30</sup> However, there is still no clear evidence on the effectiveness of one treatment over the other for the control of myofascial pain, since studies report divergent data in which manual therapy is sometimes superior to counseling<sup>10</sup> and sometimes not.<sup>4</sup>

Considering the variability of the few studies in the literature evaluating manual therapy for TMD myofascial pain, further clinical trials are required to confirm the results found in the present review.

## Conclusions

Manual therapy was better than no treatment in one study and better than counseling in another study. However, manual therapy combined with counseling was not statistically better than counseling alone, and manual therapy alone was not more efficient than botulinum toxin. Manual therapy combined with home therapy was better than home therapy alone in one study. Further studies are required due to the inconclusive data and poor homogeneity found in this review.

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