Manual Therapy 21 (2016) 10–17

Contents lists available at ScienceDirect

Manual Therapy

journal homepage: www.elsevier.com/math

Systematic review

Efficacy of musculoskeletal manual approach in the treatment of temporomandibular joint disorder: A systematic review with meta-analysis

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ARTICLE INFO

Article history:
Received 24 March 2015
Received in revised form
2 June 2015
Accepted 16 June 2015

Keywords:
Temporomandibular joint disorder
Manual therapy
Pain
Range of motion

ABSTRACT

Background: Temporomandibular joint disorder (TMD) requires a complex diagnostic and therapeutic approach, which usually involves a multidisciplinary management. Among these treatments, musculoskeletal manual techniques are used to improve health and healing.
Objectives: To assess the effectiveness of musculoskeletal manual approach in temporomandibular joint disorder patients.
Design: A systematic review with meta-analysis.
Methods: During August 2014 a systematic review of relevant databases (PubMed, The Cochrane Library, PEDro and ISI web of knowledge) was performed to identify controlled clinical trials without date restriction and restricted to the English language. Clinical outcomes were pain and range of motion focalized in temporomandibular joint. The mean difference (MD) or standard mean difference (SMD) with 95% confidence intervals (CIs) and overall effect size were calculated at every post treatment. The PEDro scale was used to demonstrate the quality of the included studies.
Results/findings: From the 308 articles identified by the search strategy, 8 articles met the inclusion criteria. The meta-analysis showed a significant difference ($p < 0.0001$) and large effect on active mouth opening (SMD, 0.83; 95% CI, 0.42 to 1.25) and on pain during active mouth opening (MD, 1.69; 95% CI, 1.09 to 2.30) in favor of musculoskeletal manual techniques when compared to other conservative treatments for TMD.
Conclusions: Musculoskeletal manual approaches are effective for treating TMD. In the short term, there is a larger effect regarding the latter when compared to other conservative treatments for TMD.

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http://dx.doi.org/10.1016/j.math.2015.06.009
1356-689X/

1. Introduction

The temporomandibular joint (TMJ), located just anterior to the external auditory meatus, consists of upper temporalis bone and lower mandible, contains an intra-articular disk within the joint capsule, and its contractile tissue are the muscles of mastication. Collectively, anatomopathological dysfunctions of the TMJ have been defined as temporomandibular disorders (TMD) (Shaffer et al., 2014). The etiology of TMD is multidimensional, considering that neurobiological, biomechanical, neuromuscular and biopsychosocial factors may contribute to the disorder.

In the literature, treatments for TMD include patient education, home care programs, physical therapy, musculoskeletal manual approach, pharmacotherapy, nonsteroidal anti-inflammatory drugs (NSAIDs), local anesthetics, intracapsular injection of corticosteroids, muscle relaxants, antidepressants, occlusal appliance therapy, occlusal adjustment and surgical care (only indicated when non-surgical therapy has been ineffective) (Romero-Reyes and Uyanik, 2014). However, the multifactorial pathophysiology of TMJ related pain is far from being completely understood and effective management of pain has not been established yet (Lin, 2014). In addition to pain, which may be located on head, neck and face, symptoms of TMD may include limitations or deviations of mandibular movement and joint sounds with or without pain (i.e. clicks, crackles and/or tinnitus) (Kalamir et al., 2010).

Regarding conservative, non-medical and non-dental treatments, the musculoskeletal manual approaches (MMA) are noted for their impact on biological tissues involving biomechanical and neurophysiological effects (Bialosky et al., 2009, 2012). According to the Medical Subject Headings (MeSH) of the United States National Library of Medicine (NLM), Musculoskeletal Manual Approaches (MMA) are various manipulations of body tissues, muscles and bones by hands or equipment in order to improve health and circulation, relieve fatigue and promote healing. Currently, evidence suggests that MMA is effective in the treatment of musculoskeletal pain in a variety of movement disorders in spine, head and in upper and lower limbs (Licciardone et al., 2005; Chaibi et al., 2011; Slater et al., 2012; Coronado et al., 2012; Hurwitz, 2012; Brantingham et al., 2012).

The MMA for the management of TMD has also received attention from several studies. An advanced electronic search (without additional filters) in the NLM, using the key words "musculoskeletal manipulations" and "temporomandibular disorders", showed the existence of 151 articles related to the topics. Considering the evidence of this association, specifically investigated by systematic reviews, it is possible to find in an electronic search three articles: two of them (Medlicott and Harris, 2006; McNeely et al., 2006) were conducted to analyze the effectiveness of various physical therapy modalities in TMD and another one to analyze the effectiveness of manipulative and multimodal therapy (chiropractic, osteopathic, orthopedic, physical therapies) in TMD (Brantingham et al., 2013). In the review of McNeely et al. (2006) just one randomized clinical trial (RCT) provided evidence for the use of manual approach combined with active exercises to reduce pain and improve mouth opening. Medlicott and Harris (2006) recommended that active exercises and manual mobilizations or combinations of active exercises, manual therapy, postural correction, and relaxation techniques may be effective for TMD treatment. Considering the findings of these two systematic reviews that support essentially the combination of MMA with other physical therapy methods to produce favorable outcomes in TMD, the real effectiveness of different types of MMA in TMD remains unclear. However, the study of Brantingham et al. (2013), which included four RCTs on the effectiveness of MMA in TMD, reported fair levels of evidence (B) in the short term. Despite the fact that this study correctly investigated the impact of MMA on clinical improvement of TMD, no robust conclusions could be reached because of the absence of meta-analysis on this topic.

Thus, considering this context, the aim of this current systematic review and meta-analysis was to analyze the effectiveness of MMA in TMD patients and compare them to control treatments in randomized clinical trials (RCTs).

2. Materials and methods

This review was registered in PROSPERO, an international prospective register of systematic review (available at http://www.crd.york.ac.uk/PROSPERO/) under the number: CRD42015017585.

2.1. Search methods for identifying studies

Four databases (PubMed, The Cochrane Library, PEDro and ISI Web of Knowledge) were carefully examined, and the descriptors were obtained from the Medical Subject Headings (MeSH) of the NLM. The following key words in the English language were combined (by a minimum of two descriptors) for the search: Temporomandibular Joint Disorders, Temporomandibular Disorders, Temporomandibular Joint Disease, TMJ Disorders, TMJ Diseases, Musculoskeletal Manipulations, Manual Therapy, Manipulation Therapy, Manipulative Therapy. The literature review was performed in August 2014.

2.2. Selection criteria

Only RCTs in the English language were included in order to investigate the effect of different MMA techniques on the treatment of TMD, on individuals regardless of age and gender. What were considered as MMA techniques were any manipulations of body tissues, muscles and bones by hands to improve healing of the craniocervical mandibular system. The following exclusion criteria were considered: studies in which patients had a history of surgical intervention at the TMJ or interventions in which the MMA was used combined with other therapeutic resources with inadequate control comparisons (e.g. MMA and exercises vs splint therapy vs. control waiting list). The inclusion criteria were decided by consensus between the two reviewers.

2.3. Selection of studies

Two authors independently scanned titles and abstracts of the results identified by the search strategy. After that, a full text reading was done to the potentially eligible studies. Disagreements were resolved by consensus between two reviewers. The reference list of the selected articles was consulted to find possible additional studies. The duplicate items identified after searching the databases were removed.

2.4. Types of comparisons

Studies with active (e.g., home exercise, massage, usual care, sham treatment, splint therapy) and passive (e.g., no intervention, waiting list) interventions were included in this review. Therefore, the procedure of meta-analysis the MMA intervention was compared only with active control groups and not with untreated control groups.

2.5. Primary outcomes

The primary outcomes were pain and range of motion (ROM). The pain was measured by a number rating scale (NRS) for active and passive mouth opening. Studies have assessed active and