

Effectiveness of dry needling on reducing pain intensity in patients with myofascial pain syndrome: a Meta-analysis

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Abstract

OBJECTIVE: To summarize the literature about the effectiveness of dry needling (DN) on relieving pain and increasing range of motion (ROM) in individuals with myofascial pain syndrome (MPS).

METHODS: Papers published from January 2000 to January 2013 were identified through an electronic search in the databases MEDLINE, Dialnet, Cochrane Library Plus, Physiotherapy Evidence Database (PEDro) and Spanish Superior Council of Scientific Research (CSIC). The studies included were randomized controlled trials written in English and/or Spanish about the effectiveness of DN on pain and ROM in individuals with MPS.

RESULTS: Out of 19 clinical trials that were potentially relevant, a total of 10 were included in the Me-

ta-analysis. Regarding pain intensity reduction when measured before and immediately after the intervention, DN achieved improvement compared with the placebo treatment [$d = -0.49$; 95% $CI (-3.21, 0.42)$] and with the control group [$d = -9.13$; 95% $CI (-14.70, -3.56)$]. However, other treatments achieved better results on the same variable compared with DN, considering the measurements for pre-treatment and immediately after [$d = 2.54$; 95% $CI (-0.40, 5.48)$], as well as the pre-treatment and after 3-4 weeks [$d = 4.23$; 95% $CI (0.78, 7.68)$]. DN showed a significantly increased ROM when measured before the intervention and immediately after, in comparison with the placebo [$d = 2.00$; 95% $CI (1.60, 2.41)$]. However, other treatments achieved a significant better result regarding ROM when it was measured before the intervention and immediately after, as compared with DN [$d = -1.42$; 95% $CI (-1.84, -0.99)$].

CONCLUSION: DN was less effective on decreasing pain comparing to the placebo group. Other treatments were more effective than DN on reducing pain after 3-4 weeks. However, on increasing ROM, DN was more effective comparing to that of placebo group, but less than other treatments.

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Key words: Dry needling; Myofascial pain syndromes; Rehabilitation; Meta-analysis

INTRODUCTION

Myofascial pain syndrome (MPS) is one of the most frequent causes of musculoskeletal chronic pain. Myo-

fascial trigger point (MTP) causes MPS due to the presence of hypersensitive nodules.^{1,2}

The MTP is a hyperirritable structure located in the tense band of a muscle. After its stimulation, the MTP is responsible for referred pain (outside the area of the MTP) and unspecific pain with a variable severity. These points are of unknown etiology and they are characterized by a motor alteration (resistant muscular band) and a sensitive alteration (numbness and referred pain).¹

The most accepted theory regarding to the nature of the MTP, known as integrated hypothesis, was described by Simons² in 1996 and subsequently expanded³ and updated.⁴ Although it needs to be fully consolidated through experimentation, it provides answers to questions regarding what MTP is, where they are located and what would be the best approaches for their management.⁵

According to this theory, the MTP constitute a neuromuscular pathology initiated by a pre-synaptic dysfunction of the motor plate characterized by an excessive release of acetylcholine (ACh) in the synaptic cleft that causes a localized contracture of the sarcomere closest to the motor plate. This contracture would cause the increase of tension in the affected fibre, hypoxia due to the vascular compression and accumulation of sensitizing substances which are responsible for the hyperalgesia of the MTP and a poor level of acetyl cholinesterase. This deficit could mean a synaptic dysfunction that would add to the presynaptic problem of the excess release of ACh and to any possible postsynaptic conflict related to the amount of ACh receptors or their sensitivity. All this would close the cycle and would explain the capacity of the MTP to self-perpetuate, as there are mechanisms that could continue the alterations even if the initial presynaptic dysfunction would resolve.⁵

The main characteristic of MTPs is that they cause referred pain with a specific pattern for each muscle, what favours the treatment approach through local interventions. Besides, this symptomatology is reproduced when pressure is being applied on that point and they are activated with overpressure, trauma, mood and/or reflex causes.⁶

There are many treatment techniques for the management of MTP and they include conservative and invasive techniques. Scientific evidence shows that conservative techniques are the most applied treatments for this syndrome, including physical therapy,^{7,8} stretching, massage and electrotherapy.⁹ However, invasive techniques, such as botulin toxin injections,¹⁰ acupuncture,¹¹ electroacupuncture¹² and dry needling (DN), have been introduced recently.

One of the newest therapies used to treat MPS is DN. It is performed by inserting a needle at the MTP at subcutaneous or muscle level. The mechanic stimulus of the needle is used as a physical agent to remove the MTP without injection or extraction of any substance

and causing a local spasm response.⁵ The needling does not stay in place and it is removed once the MTP has been deactivated.¹³ After its deactivation, etiological and disturbing factors of the MTP must be controlled to avoid relapses.^{5,13} The dry needling action mechanism is based on the gate control theory of pain developed by Furlan *et al.*¹³ DN causes the inhibition of the C fibers that carry the MTP pain impulses. This inhibition is due to the activation of the A-delta fibers when the needle perforates the skin and to the relaxation of the tense MTP muscle band.

Recent investigations showed on conclusive results on the effectiveness of DN to manage MTP. The systematic review carried out by Cummings *et al.*¹⁴ in 2001 and other studies, such as the one from Kietrys *et al.*¹⁵ in 2013, can be found in the literature. Despite concluding that DN decreased pain immediately after its application when comparing with sham needle or placebo, their search was only done in very few databases. In addition, Tough *et al.*¹⁶ published a systematic review in 2009, where DN was compared with acupuncture, standardized care and placebo.

We summarized the literature about the effectiveness of dry needling on decreasing pain and increasing range of motion (ROM) in individuals with MPS.

METHODS

Search strategy

This study is a systematic review of randomized controlled trials. The eligibility criteria were: articles published from January 2000 to January 2013, written in English and Spanish and studies where interventions were applied on patients with MPS, whatever their location, intensity and duration and based on treatments with the DN technique.

The electronic databases MEDLINE, Dialnet, Cochrane Library Plus, "The Physiotherapy Evidence Database" PEDro and CSIC (IME, ISOC) were used. In MEDLINE, "The Physiotherapy Evidence Database" PEDro, Cochrane Library Plus and CSIC databases, the same key words used were: "Dry needling AND myofascial pain syndromes AND Physiotherapy", "dry needling AND trigger points", "myofascial pain syndrome AND trigger points AND physiotherapy". In Dialnet, the following Spanish key words were used: "punción seca y dolor miofascial" (Dry needling AND myofascial pain), "Punción seca y puntos gatillo" (dry needling AND trigger points), "Síndrome de dolor miofascial y puntos gatillo y fisioterapia" (myofascial pain syndrome AND trigger points AND physiotherapy).

Afterwards, a manual search was done on all relevant journals available to the research group, which were not indexed on the searched electronic databases. These included publications in all the pre-indexed issues of Acupuncture in Medicine and Revista Interna-

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