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REVIEW ARTICLE (META-ANALYSIS)

Effectiveness of Dry Needling for Myofascial Trigger Points Associated With Neck and Shoulder Pain: A Systematic Review and Meta-Analysis

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Abstract

Objective: To evaluate current evidence of the effectiveness of dry needling of myofascial trigger points (MTrPs) associated with neck and shoulder pain.

Data Sources: PubMed, EBSCO, Physiotherapy Evidence Database, ScienceDirect, The Cochrane Library, ClinicalKey, Wanfang Data Chinese database, China Knowledge Resource Integrated Database, Chinese Chongqing VIP Information, and SpringerLink databases were searched from database inception to January 2014.

Study Selection: Randomized controlled trials were performed to determine whether dry needling was used as the main treatment and whether pain intensity was included as an outcome. Participants were diagnosed with MTrPs associated with neck and shoulder pain.

Data Extraction: Two reviewers independently screened the articles, scored methodological quality, and extracted data. The results of the study of pain intensity were extracted in the form of mean and SD data. Twenty randomized controlled trials involving 839 patients were identified for meta-analysis.

Data Synthesis: Meta-analyses were performed using RevMan version 5.2 and Stata version 12.0. The results suggested that compared with control/sham, dry needling of MTrPs was effective in the short term (immediately to 3 days) (standardized mean difference [SMD] = −1.91; 95% confidence interval [CI], −3.10 to −.73; $P = .002$) and medium term (SMD = −1.07; 95% CI, −1.87 to −.27; $P = .009$); however, wet needling (including lidocaine) was superior to dry needling in relieving MTrP pain in the medium term (SMD = 1.69; 95% CI, .40−2.98; $P = .01$). Other therapies (including physiotherapy) were more effective than dry needling in treating MTrP pain in the medium term (9−28d) (SMD = .62; 95% CI, .02−1.21; $P = .04$).

Conclusions: Dry needling can be recommended for relieving MTrP pain in neck and shoulders in the short and medium term, but wet needling is found to be more effective than dry needling in relieving MTrP pain in neck and shoulders in the medium term.

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Myofascial trigger points (MTrPs) are localized, hyperirritable spots in the skeletal muscles associated with palpable nodules in muscle fibers.[1,2] These spots can be classified into active MTrPs and latent MTrPs with referred pain and local twitch responses.[1,3,4] Epidemiological surveys have shown that 30% to 85% of the population in the United States and 18.7% to 85.1% in Germany has MTrP pain.[5,6]

Numerous studies have shown that MTrPs are prevalent in patients with chronic nontraumatic neck and shoulder pain.[7-11] A recent survey of 72 patients with shoulder pain showed that active MTrPs were prevalent in the infraspinatus (77%) and the upper trapezius muscles (58%), whereas latent MTrPs were prevalent in the teres major (49%) and anterior deltoid muscles (38%).[12] Persistence of MTrPs in neck and shoulder muscles for long periods will result in headache, neck and shoulder pain, dizziness or vertigo, limited neck and shoulder range of motion, abnormal sensation, autonomic dysfunction, and disability.[10,13-16]

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Conservative interventions for MTrPs include dry needling, wet needling (eg, lidocaine injection and some local anesthetic injections), ischemic compression, physiotherapy, laser, and oral drugs.[17] Of these therapies, dry needling has been widely used in clinical practice because of its simple operation and good efficacy.[18,19] In 2001, a systematic review conducted by Cummings and White[18] found that direct needling of MTrPs seems to be an effective treatment, but evidence of the long-term efficacy of needling therapies beyond placebo from clinical trials was lacking at that time. A systematic review with meta-analysis[20] found that dry needling, compared with control/sham, can decrease pain immediately after the treatment and in 4 weeks in patients with upper quarter myofascial pain syndrome. Nonetheless, the number of high-quality randomized controlled trials (RCTs) was limited, and evidence of the long-term efficacy of dry needling for myofascial pain syndrome associated with neck and shoulder pain was lacking in this meta-analysis; thus, large-scale, multiple-term RCTs are necessary to support this recommendation. More recently, another systematic review[21] found no significant difference between dry needling and lidocaine injection for MTrPs in neck and shoulders immediately after the treatment, at 1 month, and at 3 to 6 months; however, some errors affecting the meta-analysis results were identified; there was no difference between dry needling and physical therapy for MTrPs in neck and shoulders.

Therefore, this systematic review and meta-analysis aimed to determine the short-, medium-, and long-term effectiveness of dry needling in relieving pain in patients with MTrPs in neck and shoulders compared with control/sham dry needling, wet needling, and other treatments (including physical therapy, botulinum toxin injection, and miniscalpel-needle release).

Methods

Search strategy

A systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.[22] We searched sequentially electronic databases (PubMed, EBSCO, Physiotherapy Evidence Database [PEDro], ScienceDirect, The Cochrane Library, ClinicalKey, Wanfang Data Chinese database, China Knowledge Resource Integrated Database, Chinese Chongqing VIP Information, SpringerLink) from database inception to January 2014. The searches were limited (where database facilities allowed) to RCTs or clinical trials, but without language restriction. The search terms were (acupu* OR needl*) AND (myofascial pain OR trigger point* OR trigger area* OR taut band*) AND random*. Moreover, supplementary searches were conducted online (eg, http://www.google.cn and http://www.clinicaltrials.gov) to obtain articles that could not be found in the databases via the university library website and to check for any omitted trials.

List of abbreviations:

CI	**confidence interval**
MCID	**minimum clinically important difference**
MTrP	**myofascial trigger point**
NRS	**numerical rating scale**
PEDro	**Physiotherapy Evidence Database**
RCT	**randomized controlled trial**
SMD	**standardized mean difference**
VAS	**visual analog scale**

Inclusion and exclusion criteria

Studies were included if they (1) had RCT design; (2) included patients with MTrPs associated with neck and shoulder pain; (3) used acupuncture or dry needling as an intervention; and (4) had at least 1 outcome measure of either visual analog scale (VAS) or numerical rating scale (NRS) to assess pain intensity. Meanwhile, studies were excluded if (1) MTrPs were not defined according to the criteria of Simons et al[1]; (2) MTrPs in patients with neck and shoulder pain were latent MTrPs; (3) different types of dry needling were compared with each other; (4) RCT subjects were animals; and (5) RCT reported no data/results.

Study selection and data extraction

Two authors scanned the titles and abstracts independently, and studies that satisfied the inclusion and exclusion criteria were retrieved for full-text assessment. We extracted data on the sample size of the population, number of male and female patients, mean age of the population, duration of symptoms, diagnosis, location and interventions adopted for MTrPs, outcome measures, the time to achieve the outcome, and PEDro scores. The results of the study of pain intensity (VAS/NRS) were extracted in the form of mean and SD data.

Outcome measures were classified as short term if the measure was applied immediately to 3 days after the final reported treatment, medium term if applied 9−28 days after the final reported treatment, and long term if applied 2 to 6 months after the final reported treatment.

The remaining discrepancies in data extraction were resolved after a discussion between the 2 reviewers. A third reviewer adjudicated when necessary.

Quality assessment

Two reviewers independently assessed the validity of the studies included by using the PEDro quality scale. Any disagreements were resolved with a discussion between the 2 reviewers. A third reviewer adjudicated when necessary. The PEDro scale rates the quality of RCTs that evaluate the therapeutic interventions on the basis of the presence or absence of key methodological components.[23,24] Studies with scores $\geq$6/10 were considered as high-quality evidence, and studies with scores $\leq$5/10 were considered as low-quality evidence.

Data synthesis and statistical analysis

Nine separate meta-analyses were performed with pain on VAS/NRS as the outcome measure. The 9 meta-analyses are as follows: dry needling compared with control/sham in the short, medium, and long term; dry needling compared with wet needling in the short, medium, and long term; and dry needling compared with other treatments in the short, medium, and long term.

Meta-analyses were performed using RevMan version 5.2[a] with a continuous variable random-effects model to account for the additional uncertainty associated with interstudy variability in effect of the intervention.[23] Heterogeneity was assessed using the Cochran Q test, which had statistical significance ($P<0.1$), and the chi-square test (I^2), which indicated inconsistency by a quantitative number.[25] An I^2 value of 25%, 50%, and 75% represented small, moderate, and large degrees of heterogeneity,