

Clinical Effectiveness of Dry Needling Immediately After Application on Myofascial Trigger Point in Upper Trapezius Muscle

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ABSTRACT

Objective: The purpose of this study was to investigate the effect of dry needling (DN) on pain intensity and pressure pain threshold (PPT) compared with ischemic compression (IC) immediately and 48 hours after each treatment session in individuals with myofascial trigger points in the upper trapezius muscle.

Methods: Thirty-one patients with myofascial trigger points in the upper trapezius muscle participated in this study. Patients were randomly assigned to a standard (N = 17) or experimental group (N = 14). The treatment protocol for the standard group consisted of IC, whereas the patients in the experimental group received DN.

Results: The results indicated that the effect size of the DN methods for pain intensity and PPT was considerably greater after 2 days compared with immediately after the treatment session. In contrast, the effect of the IC for PPT was greater immediately after treatment compared with the measures after 2 days. There was also no noticeable difference in the effect size for IC on pain intensity between the scores obtained immediately and 2 days after treatment. However, our data also revealed a greater effect size for DN on PPT after 2 days compared with the IC technique.

Conclusions: In this study, DN improved the pain intensity and PPT after 2 days. However, it had no clinical improvement immediately after application because of muscle soreness. Thus, assessment of the effect of DN immediately after application can be criticized, and the results should be interpreted with caution. (*J Chiropr Med* 2016;xx:1-8)

Key Indexing Terms: *Trigger Point; Upper Trapezius; Dry Needling; Ischemic Compression*

INTRODUCTION

Musculoskeletal pain is a major cause of morbidity in today's societies.¹⁻³ About one-third of the patients with musculoskeletal pain meet the diagnostic criteria for myofascial pain syndrome.¹ A myofascial trigger point (MTP) has been described as a hyperirritable spot located in a taut band of muscle, or a small pea or ropelike nodular or crepitant (crackling, grating) area within the muscle that is painful to palpation or compression and refers pain, tenderness, or an autonomic response to a remote area.⁴

Previous studies have indicated that MTPs are the primary source of musculoskeletal pain in patients. The prevalence of trigger point varies from 21% of patients seen

in a general orthopedic clinic, to 30% of general medical clinic patients with regional pain, to as high as 85% to 93% of patients presenting to specialty pain management centers.^{5,6} It has detrimental effects on people's social and work-related activities, has a significant impact on the quality of life, and causes pain and functional disability in the neck and shoulder areas.^{2,3}

Some chemical changes, such as increased levels of bradykinin, substance P, and calcitonin gene-related peptide and lowered pH, have been reported in MTP.^{7,8} Investigators established that the local oxygen saturation at an MTP site is less than 5% of normal.⁸ Hypoxia leads to a drop in tissue pH and the release of several nociceptive chemicals, including bradykinin, calcitonin gene-related peptide, and substance P.⁸ Local tenderness and referred pain are common with MTPs as muscle nociceptors are stimulated in response to reduced oxygen levels and lowered pH and increased inflammatory chemicals. Histologic studies have confirmed the presence of extreme sarcomere contractions, resulting in localized tissue hypoxia.⁸

The upper trapezius (UT) muscle was determined to be often affected by MTPs.^{4,9}

The common symptoms and pain pattern in participants with MTPs in the UT muscle are taut and painful muscle,

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tension headache, neck pain, dizziness or vertigo, and limited neck and shoulder range of motion.^{4,9}

One of the unique characteristics of an MTP is the local twitch response (LTR) phenomenon, which is an involuntary spinal cord reflex contraction of the contracted muscle fibers in a taut band after palpation or needling of the taut band in MTPs.^{8,10,11}

Several treatment protocols have been suggested for MTPs.^{1,12,13} Physical therapy programs play a significant role in treatment and improvement of symptoms in patients with MTP. Ischemic compression (IC) is one of the most common treatment methods currently used for patients with MTP attending physical therapy clinics.^{1,12,13}

More recently, there has been an increased interest in the use of dry needling (DN) by therapists to treat MTP.⁸ Dry needling, also referred to as intramuscular stimulation, is an invasive procedure in which an acupuncture needle is inserted into the skin and muscle.¹¹ The objectives of DN include inactivating the MTP, normalizing the chemical environment of active MTPs, releasing muscle shortening, removing the source of muscle irritation, normalizing peripheral nerve sensitization, promoting self-healing of the injured tissue, and decreasing spontaneous muscle activity.⁸

Investigators have attributed the therapeutic effects of DN to various mechanisms, such as mechanical, neurophysiologic, and chemical effects.^{8,10,11} It is thought that DN provides a mechanical localized stretch to the shortened sarcomeres and contracted cytoskeletal structures within the MTP.^{8,10,11} Dry needling effects may also stimulate A δ nerve fibers (group III), which in turn may activate the enkephalinergic inhibitory dorsal horn interneurons, resulting in opioid-mediated pain suppression and pain relief.^{8,11} Some studies have reported that DN may influence the microcirculation in skin or muscle blood flow and levels of chemical properties at the MTP area.^{14,15}

Although some previous studies have assessed the effect of DN on MTP in UT muscles, a review of the published reports determined that some randomized clinical trials have been conducted to determine the effectiveness of DN in the treatment of MTP in UT muscle.¹⁶⁻²¹ However, with the use of different designs, samples, and testing procedures, controversial results have been reported regarding the effect of DN on MTP in UT muscles.¹⁶⁻²¹ Most of the previous studies have assessed the clinical effectiveness of DN immediately after treatment procedures.^{17,19-21}

Muscle soreness is a common report after DN application.²⁰ Typically, after DN technique the muscle soreness lasts and may be felt for a few hours up to 24 to 48 hours.²⁰ Considering this soreness after DN, the results collected immediately after treatment, such as pain intensity and pressure pain threshold (PPT), may be affected by soreness caused by needle insertion to the muscle. Because of the risk of muscle soreness, assessment of only immediate effects of DN can be criticized, and the results from the studies that measured the variables immediately after needling should be interpreted with caution.

To our knowledge, no study has assessed and compared the effect of DN in the treatment of MTP in UT muscle immediately and 48 hours after DN, when soreness has been relieved.^{14,17-22} The purpose of this study was to investigate the effect of DN compared with IC on pain intensity and PPT immediately after each treatment session compared with the measurements obtained 48 hours after each treatment session in individuals with MTP in the UT muscle.

MATERIALS AND METHODS

General Design

A randomized controlled trial was performed (registered with the [ClinicalTrials.gov](https://clinicaltrials.gov), NCT 02107456) to investigate the clinical effect of DN compared with IC on pain intensity and PPT immediately and 48 hours after each treatment session in patients with MTP in the UT muscle. The study protocol was approved by human research ethics committee of the University of Social Welfare and Rehabilitation Sciences, Tehran, Iran (reference no. 100-201; 2013). Before participating in the study, all participants signed an informed consent form approved by the human participants committee.

Participants

A total of 31 nonpregnant women with MTPs in the UT muscle, who had been referred for outpatient physical therapy evaluation and intervention, participated in this study. The patient population in this study was a sample of convenience made up of participants aged between 20 and 48 years. They were consecutive patients who agreed to participate and fulfilled the inclusion criteria. The inclusion criteria for having active MTP in the UT muscle were as follows^{23,24}:

1. Presence of palpable taut band in muscle.
2. Presence of a hypersensitive tender spot in the taut band.
3. Reproduction of the typical referred pain pattern of the MTP in response to compression. For third criteria (detecting active MTP), MTP pressure tolerance was assessed using a mechanical pressure algometer. The investigator applied continuous pressure with the algometer at a pressure of approximately 2.5 kg/cm².
4. Spontaneous presence of the typical referred pain pattern or patient recognition of the referred pain as familiar.
5. Pain of at least 30 mm on a numeric pain scale (NPS).²⁴

The selected MTP of the UT muscle was located in the middle of the more nearly horizontal fibers of the UT.¹⁹

Patients were also excluded if they had a history of fibromyalgia syndrome, whiplash injury, cervical spine surgery and fracture, cervical radiculopathy, having MTP therapy within the past month before the study, or if they

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