

The Effects of Pressure Release, Phonophoresis of Hydrocortisone, and Ultrasound on Upper Trapezius Latent Myofascial Trigger Point

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ABSTRACT. Sarrafzadeh J, Ahmadi A, Yassin M. The effects of pressure release, phonophoresis of hydrocortisone, and ultrasound on upper trapezius latent myofascial trigger point. *Arch Phys Med Rehabil* 2012;93:72-7.

Objective: To compare the effects of pressure release (PR), phonophoresis of hydrocortisone (PhH) 1%, and ultrasonic therapy (UT) in patients with an upper trapezius latent myofascial trigger point (MTP).

Design: Repeated-measure design.

Setting: A pain control medical clinic.

Participants: Subjects (N=60; mean±SD age, 21.78±1.76y) with a diagnosis of upper trapezius MTP participated in this study. Subjects were randomly divided into 4 groups: PR, PhH, UT, and control (15 in each group). All patients had a latent MTP in the upper trapezius muscle.

Interventions: PR, PhH, UT.

Main Outcome Measures: Subjective pain intensity, pain pressure threshold (PPT), and active cervical lateral flexion range of motion were assessed in 6 sessions.

Results: All 3 treatment groups showed decreases in pain and PPT and an increase in cervical lateral flexion range of motion ($P<.001$) compared with the control group. Both PhH and PR techniques showed more significant therapeutic effects than UT ($P<.001$).

Conclusions: Our results indicate that all 3 treatments used in this study were effective for treating MTP. According to this study, PhH is suggested as a new method effective for the treatment of MTP.

Key Words: Myofascial pain syndromes; Pain; Phonophoresis; Rehabilitation; Ultrasonic therapy.

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MYOFASCIAL TRIGGER POINT (MTP) is a hyperirritable nodule of spot tenderness in a palpable taut band of skeletal muscle that can refer pain to a distant point and also causes distant motor and autonomic effects.^{1,2} MTP prevalence varies from 21% of patients presenting to a general orthopedic clinic to up to 93% seen in specialty pain management centers.³ The exact cause of MTP is still unknown, but Simons et al² hypothesized that some muscle fibers shorten and form taut bands in response to the release of calcium ions from damaged

fibers or excessive amounts of acetylcholine from the motor end plate.

The upper trapezius is probably the muscle most often beset by MTP,^{4,5} and Fischer⁶ indicated that the upper trapezius is the most sensitive of 8 different muscles (upper trapezius, pectoralis major, levator scapulae, teres major, supraspinatus, gluteus medius, infraspinatus, paraspinals) to the pressure of an algometer.⁶

MTP is classified clinically as latent and active,⁷⁻⁹ and the spontaneous presence of the typical referred pain pattern and/or patient recognition of the referred pain as familiar can be a measure to differentiate latent versus active MTP.^{2,10} Latent MTP also is introduced as a reason for activity pattern disorders.¹¹⁻¹³ A number of treatments are available for MTP in the 2 categories of invasive and noninvasive techniques. Some invasive techniques consist of injection therapy and dry needling, whereas noninvasive approaches include massage, stretching, and ultrasound.^{2,3,14-18}

Phonophoresis is a therapeutic method that may be helpful for the treatment of MTP. However, there is little information about the mechanisms of this technique.¹⁹ Despite the lack of evidence for the effectiveness of phonophoresis, the impact of pressure release (PR) has been made crystal clear in numerous studies.^{7,15,20-24} For this reason, we decided to compare phonophoresis of hydrocortisone (PhH) with PR. In addition, to determine the pure effects of ultrasonic therapy (UT) and algometry, 2 independent groups (UT, control) also were added to this study. The aim of the present study was to investigate the effect of PR, PhH, and UT on pain intensity, pain pressure threshold (PPT), and active cervical lateral flexion range of motion in latent MTP of the upper trapezius muscles.

METHODS

A convenience sample of 60 women who were identified with 1 MTP available in the upper trapezius muscle during the last 3 months to 1 year were recruited. Because the existence of numerous MTPs may affect the outcome,²⁵ we selected subjects with at least 1 MTP in the upper trapezius. Anthropometric characteristics of subjects are listed in [table 1](#).

List of Abbreviations

ANOVA	analysis of variance
CLF	contralateral lateral flexion
ILF	ipsilateral lateral flexion
K-S	Kolmogorov-Smirnov
MTP	myofascial trigger point
PhH	phonophoresis of hydrocortisone
PPT	pain pressure threshold
PR	pressure release
UT	ultrasonic therapy
VAS	visual analog scale

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Table 1: Characteristics of Subjects

Variable	Control (n=15)	UT (n=15)	PR (n=15)	PhH (n=15)	P
Age (y)	22.20±1.82	21.47±5.99	21.53±1.72	21.93±1.98	.638
Weight (kg)	54.73±5.71	54.47±1.55	56.07±7.07	57.67±6.84	.508
Height (cm)	163.87±7.23	163.13±6.43	162.93±4.52	163.60±5.53	.973

NOTE. N=60. Values expressed as mean±SD unless noted otherwise. Results of ANOVA test showed no significant differences among the 4 groups.

All subjects were given a clear explanation of tests and treatments approved by the Tehran University of Medical Sciences and signed the informed consent before taking part in this research. Patients were evaluated for the presence of a latent MTP in the upper trapezius muscle with manual palpation. Table 2 lists patients' inclusion and exclusion criteria.^{23,26} After the first evaluation session, patients were systematically assigned to 4 groups: PhH, PR, UT, and control (n=15 in each group).

To find the MTP region in each session, a designed 10×10-cm transparency sheet containing 1 and 4 lateral hollow parts was used after identification of the MTP. The sheet was placed on the point of MTP, and its 4 lateral parts were filled with skin markers in the first evaluation session. This made it easier to differentiate the MTP area throughout various sessions.

Pain intensity, PPT, and active range of motion were evaluated by an experienced physiotherapist in all 6 sessions for all groups. Treatment groups were treated by using the mentioned techniques (PhH, PR, UT) from sessions 2 to 5, whereas in sessions 1 and 6, only assessment of primary outcomes (pain intensity, PPT, active range of lateral flexion) was carried out.

The range of active ipsilateral flexion (ILF) and contralateral lateral flexion (CLF) of the cervical spine was measured by using a dual inclinometer^a consisting of master and slave parts that records the greatest range of motion for each movement. The master part was placed parallel to the shoulders horizontally, and the slave part was placed on the lateral border of the head (fig 1). The reliability of this method was investigated in 30 healthy subjects before the study and an interclass correlation coefficient model 2, 1 of 97% and standard error of measurement of 0.99° were obtained.

PPT was measured with a digital algometer^a consisting of a 1-cm wide disk that was pressed vertically on the MTP. To provoke the patient's pain, pressure was increased with a speed of 1kg·cm⁻²·s⁻¹.^{7,23} This procedure was performed 3 times with 10-second intervals, and the average value was determined as PPT.^{6,23,27-29}

Furthermore, to evaluate pain intensity, a pressure of 25N was exerted on the MTP using the algometer and patients were asked to show their pain on the visual analog scale (VAS). The VAS was a 10-cm horizontal line divided into 10 equal parts. After introducing candidates to the VAS, the evaluation took place and pain intensity was recorded.²³ To evaluate the magnitude of pain, the VAS was used simultaneously with the algometer, but for determining PPT, the algometer was used alone.^{7,23}

All patients were asked to lie down in a prone position, and the neck was placed in a neutral position during the study.

Phonophoresis of Hydrocortisone

PhH 1% (pulse mode, 1.2W/cm²; 1MHz; spatial average temporal average, 0.2W/cm² for 5min) was applied by using a Sonopuls 434,^b which had an applicator with a cross-sectional area of 1cm². Before the start of treatment, the therapist thoroughly cleaned the subject's skin with alcohol, and after specifying the concerned point, hydrocortisone 1% gel was applied over the MTP. During this treatment, the ultrasound applicator was moved rotationally on the MTP with similar speed and pressure for all subjects.^{6,20,30-33}

Pressure Release

In this group, after identifying the MTP, the algometer disk was put on the MTP and pressure equal to the average PPT, which was obtained at the first evaluation session, was exerted. During this treatment, pressure increased after reported pain reduction by the patient until pain recurrence was reported. This procedure lasted about 90 seconds.^{7,22-24,32}

Ultrasonic Therapy

This procedure was exactly like PhH, but without the use of hydrocortisone gel. The pulse mode 1.2W/cm² dose with 1MHz frequency for 5 minutes was applied.^{20,30,33} This group was designed to indicate the effect of UT alone.

Table 2: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Presence of a palpable taut band in a skeletal muscle	Diagnosis of fibromyalgia syndrome according to the American College of Rheumatology
Presence of a nodule	History of whiplash injury
Presence of at least 1 hypersensitive tender spot in the taut band in response to 25N of pressure	History of cervical spine surgery
	Diagnosis of cervical radiculopathy or myelopathy determined by the primary care physician
	Having myofascial therapy within the past month before the study
	Presence of spontaneous referred pain pattern (Active Trigger Point)
	Presence of jump sign
	Being in the period of menstrual cycle
	Presence of postural disorders

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