Effectiveness of Myofascial Release in Improving Pain, Pain Pressure Threshold and Disability as Compared with Standard Care in Upper Trapezius Myofascial Trigger Points

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Abstract

Background and Objective: Pain in the neck region is very common in the area of the upper trapezius muscle. In adults and women population the prevalence of neck pain is very high. It varies with a mean point prevalence of 13% to the lifetime prevalence of 50%. Muscles are very painful after the injury feeling like stiffness and spasm in the muscles. Many of the physiotherapy protocols like MWD, heat modalities, tens, spray, ultrasound, stretch, muscle energy technique (post isometric relaxation); many others included the use of deep friction massage (DFM) and ischemic compression are used in inactivation trigger points in previous studies. But these studies did not find evidence of functional improvements after the treatment. The aim of this study is therefore, to check the effectiveness of Myofascial Release in improving pain, pain pressure threshold and disability as compared with Standard Care in Upper Trapezius Myofascial Trigger Points.

Study Design: Experimental comparative study

Study Setting: Department of Rehabilitation Sciences.

Outcome Measures: VAS, PPT, NPADS, CROM

Materials & Method: The intervention in group A given was U. S and TENS followed by stretching. The patient was in a sitting position. The depth of ultrasound was 1.5 w/cm2 (1 MHz) with a duration of 5 minutes. The parameter for TENS was used as a negative monophasic impulse, low intensity (<10μA), frequency(<10HZ) short duration(10-40μs). This was followed by stretching of upper trapezius 3 repetitions and 90sec hold. Group B DTFM 10 minutes followed by 90-sec stretching.

Results: Within-group A and B there is a significant difference in Pain, PPT, NPADS and CROM as P<0.01 while in between the group there is no significant difference in Pain, PPT, NPADS and CROM as P >0.563, P>0.238, P>0.634 and P>743 respectively.

Conclusion: This present study concluded that MFR and combination of both TENS and ultrasound are equally effective in treating myofascial trigger points statistically. But clinically myofascial release seems to be more effective in pain relief as well as in improving function.

Key words: *Trigger points, myofascial release, upper trapezius, musculoskeletal function, neck function.*

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Introduction

Pain in the neck region is very common in the area of the upper trapezius muscle. In adults and women population the prevalence of neck pain is very high. It varies with a mean point prevalence of 13% to the lifetime prevalence of 50%[1,2]. Muscles are very painful after the

injury feeling like stiffness and spasm in the muscles. When the main injury is not treated accurately it leads to the formation of muscle knots or points called trigger points. Trigger points are characterized by hyperirritable spots within a taut band of skeletal muscle fibers characterized by referred pain, spasm and limitation of Range of motion(ROM)[3,4]. There are two types of trigger points identified in the muscles; active trigger points and latent trigger points[5]. Travell and Simon's stated that the trigger points are the main cause for the generation of mechanical neck pain[6,7]. Many histopathological events are related to the formation of trigger points are lack of exercise, vitamin deficiencies, sustain poor posture, sleep disturbances, irregularities in sleep as well as joint problems which leads to micro-trauma and forms trigger point[8]. There is a lack of well-designed studies, the best available evidence supports that trigger points (TrPs) develop after muscle overuse. The other cause which may play an important role in trigger formation includes eccentric overload, submaximal sustained, and (sub)-maximal concentric contractions. The main factor is the local ischemia, which results in a lowered pH and the following release of several inflammatory mediators in muscle tissue[4,9,10]. Many of the physiotherapy protocols like MWD, heat modalities, Tens, spray, ultrasound, stretch, MET (post isometric relaxation); many others included the use of deep friction massage (DFM) and ischemic compression are used in inactivation trigger points in previous studies. But these studies did not find evidence of functional improvements after the treatment. Also, there is no sufficient evidence of a comparison of manual and electrotherapeutic approaches in the treatment of trigger points. The aim of this study is therefore, to check the effectiveness of Myofascial Release in improving pain, pain pressure threshold and disability as compared with Standard Care in Upper Trapezius Myofascial Trigger Points.

Method

Study design: Experimental comparative study.

Study setting: The study was conducted in the Department of Rehabilitation Sciences in 2018, Jamia Hamdard, New Delhi.

Sample size: The sample size was calculated based on a comparison of characteristics means of two groups. A total sample size of 40 participants with 20 in each group.

Participants' description: A total of forty participants then were recruited who express an interest in taking part given the information about the study. The participants were included in the group A and group B based upon following inclusion and exclusion criteria:

Inclusion criteria:

1. Age: 18-25 years.
2. Both males and females.
3. At least one active trigger point.
4. Positive jump's sign.
5. Presence of atleast one hypersensitive tender spot in response to 25N pressure.

Exclusion criteria:

1. A patient diagnosed with migraine or they were positive in Weiner's clinical interpretation.
2. Dermatitis over the back or other skin conditions.
3. Cervical disk syndromes (positive Spurling test).
4. History of blood disorder.
5. Having undergone pain therapy within the past or present month before the study.

Instrumentation:

1.Algometer

2. Cervical goniometer

3. machine sonoplus model number 992

Study procedure:

Study protocol was approved by the Research and ethical committee of Hamdard Institute of Medical Sciences, Jamia Hamdard following participants were given the informed consent. In a single-blinded study,

selected participants were divided into two groups by using the chit system. Group A was a standard care group using TENS and ultrasound following stretching and group B using deep transverse friction massage. The study protocol period was of 4 weeks. Participants were asked to attend the rehabilitation Centre two times per week, resulting in a total eight treatment sessions. The physiotherapist performs all the assessment and baseline measurements on the first day (pre-test score), these were done before starting the treatment. All the patients were asked to be in a sitting position during the study. To check pain intensity and magnitude, a pressure of 25N was exerted on the MTP using the algometer and participants were asked to show their pain on the visual analog scale (VAS). The VAS considered a 10-cm horizontal line which was divided into 10 equal parts[11,12]. Information about the VAS was given to candidates, the screening took place and pain intensity was recorded. The pain pressure threshold (PPT) was measured with algometer having a 1-cm disk which was pressed vertically down on the myofascial trigger points (MTrP)[13].

To incite the patient's pain, the pressure was raised with a speed of 1kg·cm^2. This evaluation was carried out 3 times within 10-second intervals, and the average value which was the final reading determined as the pain pressure threshold (PPT). For pain pressure threshold (PPT), the algometer was used alone. Evaluations of Pain and disability were carried out according to standardized protocols using neck pain and disability scale (NPAD) which is a valid and reliable tool (Wheeler et al, 1999)[12]. Patients were asked to properly answer each question by specifying along a 10-cm visual analog scale that belongs to each item less than 5 minutes. Item scores lined from 0 to 5 and the total score was a total of item scores, the maximum total score equal 100, that indicating maximum neck pain and disability. The lesser the total score, the more was the improvement in neck pain and disability[14]. CROM was assessed by using cervical goniometer. Normal lateral flexion is 45 degree and rotation is between 85-90 degrees.

Group A

The intervention in group A given was U. S and TENS followed by stretching. The patient was in sitting position. The depth of ultrasound was 1.5 w/cm2 (1 MHz) with a duration of 5 minutes, with the probe placed straight on a trigger point and intensity was elevated until the subject's pain resistance was reached. It was stayed at that level for 4 times- continuous 5 seconds and then reduced to the half intensity for another 15sec. and change associated with a slow inclination in the intensity with ultrasound, TENS current delivered through two carbon electrodes which were stayed at either end of the muscle belly. The parameter for TENS were used as a negative monophasic impulse, low intensity (<10μA), frequency(<10HZ) short duration(10-40μs)[15]. This was followed by stretching of upper trapezius 3 repetitions and 90sec hold. To administer two treatments sonoplus model number 992 device is used.

Group B

Group B were received deep transverse Friction Massage with the treatment time of total 10 minutes. The participant was in a relaxed sitting position on an armless chair and both feet firmly planted on the floor. The position of therapist was behind the patient. Thereafter, a gradual gentle friction was applied for 2 minutes followed by 8 minutes' friction massage to the dominant trigger point using the right thumb with the left thumb reinforcing it from top which was followed by stretching 3 reps 90 sec. hold. The patient was in supine lying while giving stretching to upper trapezius. Next session was given to patient after 48 hours of first intervention[3].

Outcome measures:

1.VAS.

2.Pain pressure threshold(PPT).

3.Neck pain and disability scale(NPADS).

4.Cervical range of motion (CROM)

Data Analysis:

All data were examined using SPSS version 17.0. It was used to assess for normality of scores and distribution of all variables was found to be normal. Being a pre and post study design, the subjects were given both interventions Deep friction massage and TENS, U.S.

Group B received deep transverse friction massage 3 minutes slow and 7 minutes vigorous followed by 3 stretches 90 second hold and group A received TENS 10 minutes followed ultrasound 5 minutes. Data were collected and statistically analyzed using pre and post study paired T-test and independent T-Test to test hypothesis and to control both within and between variability. Results were reported as means and standard deviations. For all procedures, significance was accepted at the alpha level of < 0.05.

Result and Discussion

There were 40 individuals falling age between 18-25 yrs. who reveal their interest in participating in the study. All the participants were included and completed the study and results into the data analysis. (Table 1). The duration of study was 4 weeks followed by post measurement of variables 1 week later.

Table I. Baseline characteristics of participants.

	Group A Mean ± SD	**Group B Mean ± SD**
Age (Years)	21.5000 ± 1.43270	21.0000 ± 1.80278
Weight (Kgs)	54.5000 ± 10.32422	55.0000 ± 9.18809
Height (Cms)	163.0000 ± 4.57539	163.0000 ±3.77108

Table 2: Comparison of variables VAS, PPT NPADS and CROM within Group A

	Group A (Pre-Treatment) Mean ± SD	**Group A (Post Treatment) Mean ± SD**	**P value**
Visual Analogue Scale (VAS)	6.8000 ± .69585	2.5500 ± 1.87715	<0.01
Pain Pressure Threshold (PPT)	23.3380 ± 4.06223	35.7135 ± 6.16380	<0.01
NPADS	42.4000 ±16.96948	14.6250 ±10.67199	<0.01
CROM (Left Flexion)	31.2500 ± 4.83273	41.1000 ± 3.89196	<0.01
CROM (Right Rotation)	64.0000 ± 9.26226	73.0000 ± 5.79473	<0.01

Table 3: Comparison of variables VAS, PPT, NPADS and CROM within Group B

	Group B (Pre-Treatment) Mean ± SD	Group B (Post-Treatment) Mean ± SD	P value
Visual Analogue Scale (VAS)	6.4500 ± .94451	2.5000 ± 1.70139	<0.01
Pain Pressure Threshold (PPT)	23.7130 ± 4.41733	36.6785 ± 6.21798	<0.01
NPADS	37.3000 ±14.08471	17.6000 ±15.16974	<0.01
CROM (Left Flexion)	30.4000 ± 4.76169	42.0500 ± 3.48644	<0.01
CROM (Right Rotation)	59.7500 ± 8.65645	71.5500 ± 5.82621	<0.01

Table 4: Comparison of variables PPT, VAS, NPADS and CROM in between Group A and Group B

	Group A Mean ± SD	Group B Mean ± SD	P value
Visual Analogue Scale (VAS)	2.5500 ± 1.87715	2.5000 ± 1.70139	>0.563
Pain Pressure Threshold (PPT)	35.7135 ± 6.16380	36.6785 ± 6.21798	>0.238
NPADS	14.6250 ±10.67199	17.6000 ±15.16974	>0.634
CROM (Left Flexion)	41.1000 ± 3.89196	42.0500 ± 3.48644	>0.743
CROM (Right Rotation)	73.0000 ± 5.79473	71.5500 ± 5.82621	>0.065

This study was designed to determine the Effectiveness of Myofascial Release in improving pain, pain pressure threshold and disability as compared with Standard Care in Upper Trapezius Myofascial Trigger Points. In the study all the 40 subjects who were having neck pain and had trigger points in the upper fibres of the trapezius muscles in right and/or left sides (unilateral) were included. It was found that both groups shown a very greater significant difference in pain reduction, reduction in pressure threshold, neck pain and disability scale improvement as well as CROM (lateral flexion and contralateral rotation). Paired T-test within groups was shows highly significant differences in their baseline pain intensity levels among the groups after the first treatment before the eighth treatment and 1 wk. after the eighth treatment. Post data analyses revealed that there was a decrease in the pain intensity in the DTFM group after the first treatment before eighth treatment and

1 week after eighth session p=0.05(P<0.05). The pain intensity reduction in both the TENS and ultra sound group was also significant difference P=0.05(P<0.05) as shown in table 2. Independent T-test in between the both groups reveals that there is no significant difference in improvement of pain p=0.05(p>0.563) as shown in table 4. Paired T-test within groups also reveals that there was a very significant differences in pain pressure threshold values in pre to post reading with a level of significance p=0.05(p<0.05) which was reported before starting first session and secondly reported one week after 8th session i: e (35.7135 ± 6.16380) and (36.6785 ± 6.21798). But independent T-test reveals that there was no as such significance difference in pain pressure threshold values in between groups as p=0.05(P>0.238). There was decrease in baseline reading of neck pain and disability after the first treatment of DTFM group as well TENS and ultrasound group and one week after the 8th week as compare to baseline on first day as P=0.05(<0.05). But if we compare in between group there was no as such significant difference in reduction of neck pain and disability readings both groups show nearly equal improvements based upon p value p=0.05(>0.634). Paired T used to determine the significance related to CROM as increase is very visible after 8th week and 1 week later for post measurement readings p=0.05(<0.05) as in table 2 & table 3. But Independent t-test shows that there not was very significant difference in group DTFM as well as TENS and ultrasound group statistically as p=0.05(>0.065) in table 4. But if you see practically there was greater increase in range of motion and decrease pain in DTFM group as compare to TENS and ultrasound. As per Peter D aker et al the socioeconomic factors plays an important role in the development of neck pain which may be associated with emotional factors as well as psychological factors leads to tightness in the muscle included your upper trapezius[16]. The result of all these treatments found to had conflicting results that is why it was necessary to found out appropriate approach to treat neck pain patients. Ümit Dündar et at, was conducted a study on effectiveness of ultrasound therapy in cervical myofascial pain syndrome. This study was concluded that the ultrasound therapy is very helpful in treating or inactivating trigger points[17]. Mukkannavar, P. B studied the effect of combination therapy using TENS & ultrasound and ischemic compression in the treatment of active myofascial trigger point but the result of the study shows contradictory result compare to this present study[3].Thusharika Dilrukshi Dissanayaka et al studied comparison of the effectiveness of transcutaneous electrical nerve stimulation and interferential therapy on the upper trapezius in myofascial pain syndrome. In their study they were found that TENS would lead to better reduction in pain in patient in comparision to IFT, the reason being TENS was applied with the negative electrode (cathode) over the MTrP and the positive electrode (anode) over the attachment on acromial tendon. This enabled the current to precisely target the myofascial trigger points. But in case of IFT it was not like the same process the current was delivered by applying the four electrodes over the area and there was continuous fluctuation of current density across the myofascial trigger point which lead to less effectiveness of IFT over TENS[18]. So, the evidence of previous study supports the preference of TENS over IFT in this present study. Regarding the myofascial release techniques there were many studies who support the hypothesis of this present study. The study conducted by Caesar Fernandez-de-lass-Pen˜as , based on explanation by cyraix that after injury there was increased in fibroblastic activity which was followed by scaring. The scar which formed was not aligned leads to muscle dysfunction. If myofascial release was applied perpendicular to fibres it results to alignment of fibrils thread of muscles as well as it induced inflammation which helps in the removal of unwanted substance from the injured site and promote healing with proper aligned myofibrils threads and fascia. There were many studies who gave evidence about effectiveness of manual and electrotherapeutic treatment. But these study did find the evidence of level of disability and functional improvement before and after treatment[13]. In this study both quantitative as well as qualitative measures were used to find out the disability and its impact on function improvements before and after the treatment. Myofascial release was an extensive approach to treat the trigger point followed by stretching to sustain the treatment effect. Also; TENS and ultrasound found to be very effective in relieving pain more rapidly in comparison to myofascial release. However, there were no follow up due to limited time study. So sustained recovery need to be determined for the future scope of studies for better rehabilitation

plan. This present study shows greater improvements in pain, pressure threshold, neck pain and disability scale and CROM (lateral flexion and contralateral rotation) in both the groups. Statistically there were no significant difference in improvements in between the groups.

Scope of future study: It is believed that the conclusion of present study utilizes in the future researches. There is a need for long term studies on MTrP using advanced techniques. Thus future studies should use the multidimensional approach regarding the treatments. In this study female population was more as compare to males. So future studies should have conducted on more male population.

Limitation: Limitation of this study was smaller sample size. There was no follow up after the treatment. Furthermore, studies would recommend the follow ups for long term improvements.

Conclusion: This present study concluded that MFR and combination of both TENS and ultrasound are equally effective in treating myofascial trigger points statistically. But clinically, myofascial release seems to be more effective in trigger point pain and subsequently improve neck function.

Conflict of Interest: There is no conflict of interest associated with this study.

Ethical Clearance: This study involves the human, the clearance has been taken form ethical committee of Hamdard institute of medical science, Jamia Hamdard.

Source of Funding: Self-financed.

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