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Comparative Study between Effects of Ultrasound Therapy and Sham Ultrasound Therapy on Upper Back Myofascial Pain Syndrome as Measured by Numerical Rating Scale for Pain

Authors
Dr Siddhartha Sinha Ray[1], Dr Dilip Kumar Khatua[2]*, Dr Kshetra Madhab Das[3]
[1]Tutor, Dept. of Physical Medicine & Rehabilitation, College of Medicine and Sagore Dutta Hospital, Kamarhati
[2]Professor, Dept. of P. M & R, B. S. Medical College & Hospital, Bankura
[3]Professor, Dept. of P. M & R, Burdwan Medical College & Hospital, Purba Barddhaman
*Corresponding Author
Dr Dilip Kumar Khatua
Professor, Dept. of P. M & R, B. S. Medical College & Hospital, Bankura

Abstract
Myofascial Pain syndrome is a common disorder of musculoskeletal system. It is associated with Myofascial Trigger points. Ultrasound therapy is an accepted method of non-pharmacological treatment of Myofascial Pain Syndrome. In this prospective comparative study we aimed to compare effect of Ultrasound Therapy with control sham Ultrasound on upper back Myofacial pain Syndrome.
Sixty patients were selected in two equal group of thirty each as study and control group. Study group received Ultrasound therapy and the control group got sham therapy. All patients received common treatment like NSAIDs, exercise and massage. 22 patients in study group and 23 patients in control finished the study. Majority patients were female, in fourth decade of life. The improvement in study group was significant. But, control group also improved significantly showing no significant difference between groups.
The study highlighted the significance of common treatments as confounding factors.
Keywords: *Myofascial Pain Syndrome, Ultrasound Therapy, Pain Score, Numerical Rating Scale.*

Introduction

Myofascial pain syndrome (MPS) is a commonly encountered musculoskeletal disorder precipitated by myofascial trigger points. This painful condition can affect any of the skeletal muscles in the body. But most commonly it is manifested at the neck and upper back mucles. The pathophysiology of MPS is not yet completely understood. It is currently hypothesized that trigger points, the most common feature of MPS, contain areas of sensitized low-threshold nociceptors (free nerve endings) with dysfunctional motor end plates. The affected muscle with the trigger point usually contains a palpable taut band or nodularity within the muscle belly. The taut band is considered to be a sustained band of contracted muscle. MPS trigger points can be classified as active or latent

depending on their clinical characteristics. An active trigger point causes spontaneous pain and is tender to palpation with referred radiating pain. Latent trigger points are tender but not spontaneously painful.[1,2,3]

Management of patients with MPS includes the elimination of chronic overuse or stress injury of affected muscles. A patient's posture, biomechanics, and joint function should be analysed carefully to identify any underlying factors that may have contributed to the development of myofascial pain. Treatment methods include pharmacological and non-pharmacological approaches. Pharmacological treatment includes oral muscle relaxants, NSAIDs, and Trigger Point Injections (TPI) with local anaesthetic, saline, or steroid. Whereas non-pharmacological approaches are consists of different therapeutic exercises, thermal and electrical modalities, the spray and stretch technique, deep massage, dry needling, bio-mechanical correction and other alternative methods like acupuncture etc. the different modalities commonly used in the treatment of myofascial pain are Transcutaneous Electrical Nerve Stimulation (TENS), and Ultra Sound Therapy (UST)

Ultrasound Therapy has been the most common choice of non-pharmacological modality in management of Myofascial Pain Syndrome. The thermal and non thermal effects of Ultrasound waves act to release the taut band formation and muscle spasm in myofascial pain and in turn act to relieve the triggering pain. There are several studies which highlights this beneficial effect of Ultrasound on Myofascial Pain Syndrome.[4,5,6,7]

As pain is the most disabling symptom in the presentation of Myofascial Pain Syndrome, same is used for assessment of post treatment improvement. There are a number of well accepted scales for measuring pain for the purpose of assessing the post treatment improvement and comparing them with pre treatment scenario. They are- Numerical Rating Scale (NRS), Visual Analogue Scale (VAS), Verbal Rating Scale (VRS), Graphical Rating Scale (GRS).

In a Numerical Rating Scale (NRS), patients are asked to circle the number between 0 and 10 that fits best to their pain intensity[8]. Zero usually represents 'no pain at all' whereas the upper limit represents 'the worst pain ever possible'. In contrast to the VAS, only the numbers themselves are valuable answers, meaning that there are only 11 possible answers in a 0–10 point NRS. It thus allows only a less-subtle distinction of pain levels compared to VAS/GRS, where there is theoretically unlimited number of possible answers.

Numerical Rating Scales have shown high correlations with other pain-assessment tools in several studies. The feasibility of its use and good compliance have also been proven. As it is easily possible to administer NRS verbally, it can be used in telephone interviews. A change on the NRS of 20% between two time-points of an assessment is regarded as being clinically significant.[9, 10, 11,12,13,14]

Aims and Objective

Aim of our study was to evaluate effects of Ultrasound in the treatment of MPS in clinical practice using rapid and easy scoring system for pain like NRS and compare these effects with control group receiving sham treatment.

Materials and Methods

This Prospective, Randomized, Sham Controlled, Double Blind Study was conducted in the Department of Physical Medicine & Rehabilitation. N.R.S. Medical College & Hospital, Kolkata for three months duration.

Approval from the Institutional Ethical Committee for the study and Informed consent from all patients included in the study were obtained. Ninety patients of myofascial pain syndrome (MPS) involving upper back as diagnosed on the basis of diagnostic features of Myofascial Pain Syndrome[15] [Table 1] attending departmental OPD were selected for the study. Patients with

hypothyroidism, anaemia, bone disorders, neuromascular conditions, radiculopathy, trauma, inflammatory conditions, cardiac conditions, generalized fatigue, depression, local or systemic infections, diabetes, contraindications of steroid and local anesthetics were excluded from the study.

Total sixty patients were included in the study. The patients were divided into two equal groups of thirty each using standard randomization technique. All the patients were assessed using NRS pain Score on the day of their first visit. One group received Ultrasound therapy for two weeks, each day for 10 minutes with 1MHz frequency and .8 watt/cm^2 intensity in continuous mode. The other group was treated as control group. They received sham treatment for same duration with same kind of setting and apparatus, without actually receiving ultrasound waves. Patients of both groups were treated with usual oral and topical NSAIDs, exercise and massage.

After the two weeks therapy each patients were evaluated again with NRS score. Neither the patient nor the investigator assessing the pre and post therapy NRS pain score was aware of the information whether that patient received actual Ultrasound or sham treatment. The resultant data was analysed as per the objective of our study with the help of Wilcoxon Matched Pair Signed Rank Test and Man-whitney U Test.

Results

Sixty patients were included in the study after evaluation as per the inclusion and exclusion criteria. They were divided in two groups of equal size with thirty patients each. But in post treatment assessment few patients in each group left the study midway and didn't either received full prescribed treatment as per schedule or didn't reported for follow up assessment. Ultimately 22 patients in the study group and 23 patients in the sham control group completed the treatment in time and were assessed properly for analysis.

Out of 45 patients completing the study only 13 patients were male and rest 32 were female. In study group there were 15 female and 7 male patients and in control group the number of male and female patients was 6 and 17 respectively. [Table 2]

The average age of the study group was 35.32 years with age ranging from 26 years to 45 years whereas in the control group the range was 26 years to 48 years and the average age was 35.47 years. The average age of the total 45 patient was 35.4 years. [Table 3]

In comparison of pre and post therapy NRS score in study group the pre therapy average score was 6.41 and in post therapy assessment the score became only 4. The difference was found to be statistically significant with p value < 0.05. In the control group the pre and post therapy average NRS score were 5.87 and 3.61 respectively. Here also the difference was significant with p value < 0.05. [Table 4]

When compared between different group the pre treatment baseline data between study and control group was not significant. The post therapy data between two groups also came as insignificant statistically. In both the cases p value were >0.05 [Table 5]

Table 1

Diagnostic Features of Myofascial Pain Syndrome[15]

A. Features that must be present to diagnose myofascial pain syndrome
1. Taut band within the muscle
2. Exquisite tenderness at a point on the taut band
3. Reproduction of the patient's pain by stimulating the taut band at the trigger point

B. Features helpful, but not required, for diagnosing myofascial pain syndrome
1. Local twitch response (important to elicit by needling when treating by injection or deep dry needling)
2. Referred pain (common and a cause of many myofascial pain syndromes)
3. Weakness
4. Restricted range of motion
5. Autonomic signs, eg, skin warmth or erythema, tearing, piloerection (goose-bumps)

Table 2

Gender	Study Group	Control Group	Total
Male	7	6	13
Female	15	17	32
All	22	23	45

Table 3

Age (Years)	Study Group	Control Group	Total
Average	35.32	35.47	35.4

Table 4

Temporal Comparison	Pre Data (Avrg)	Post Data (Avrg)	P Value
UST	6.41	4	<0.05
SHAM	5.87	3.61	<0.05

Table 5

Inter Group Comparison	UST	SHAM	P value
Pre Data	6.41	5.87	ns
Post Data	4	3.61	Ns

Discussion

In total 45 patients completed our study. Majority of them were female patient (71.11%). This observation corresponds with similar studies in myofascial pain syndrome. In their study, Kadavar et al[4] got 81.63% female patients. This skewed gender ratio in patients of myofascial pain syndrome probably indicates to the fact that female patients who does all the household chores in home all day long suffers most from upper back myofascial pain, thus highlighting chronic household over activity as a prime precipitator of upper back myomascial pain.

The average age group fell in fourth decade of life. This clearly suggests that myofascial pain syndrome attacks people in the most active age groups. In similar studies both Kadavar et al[4] and Yildirim et al[5] found average age of their study population in mid fourth decade (35.83 years) and late third decade (29.8 years) respectively.

Our study demonstrated significant improvement in NRS score in study group. It highlighted the effectiveness of Ultrasound therapy in treatment of Myofascial Pain Syndrome. Other similar studies[4,5,6,7] also show more or less identical improvement with Ultrasound therapy.

In comparing the baseline data between two groups we didn't find any meaningful difference which only underlines the effectiveness of our randomization process in selecting two groups.

But, the improvement after therapy in control also came as significant and that improvement has no significant difference from the improvement in study group. This finding probably hints at the possibility that the additional treatment that was provided to both group consisting of NSAIDs, massage and exercise may have some significant beneficial effect on Myofascial pain thus providing effective improvement even without Ultrasound therapy.

Conclusion

Significant improvement was visible in study group after two weeks Ultrasound therapy. But, the control group also demonstrated almost similar improvement pattern even without getting Ultrasound therapy. The between group comparison provided no significant variation. This result probably indicates to the confounding effect of other treatment approaches like medicine, exercise and massage that were provided to all the patients. It may also indicate that the mechanical effect of massage by the rotating transducer head and the pressure exerted with it by the therapist on the tender myofascial bands may have positive beneficial effect and the effect of the ultrasound ray itself is negligible, absent or inconsistent.

May be, proper exclusion of confounding factors, a bigger sample size and other various multi-dimensional assessment tools may help us in better understanding of the actual beneficial effect of Ultrasound therapy on Myofascial Pain Syndrome.

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