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Effect of Surged Faradic Current on Myofascial Trigger Point of Upper Trapezius Muscle as Compared with Manual Pressure Release

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Abstract: ***Background: Myofascial trigger points (MTrps) are present in most of the musculoskeletal conditions and mostly seen in upper trapezius muscle due to sustained activity in incorrect posture . This study is intended to compare the effectiveness of Surged faradic current and manual pressure release in MTrps in upper trapezius muscle. Methods: Forty patients with upper trapezius MTrps were conveniently assigned into two groups by simple random sampling. Group A was treated with surged faradic current, manual pressure release and sham ultrasound, GroupB wastreated with manual pressure release and sham ultrasound for7 days. Pain Intensity and active cervical movement (lateral flexion and side rotation to the unaffected side) were taken at 1st and 7th day of treatment programme and were evaluated by using Numerical Pain Rating Scale and universal goniometer. Result and Conclusion: Both Group A and Group B were effective within group's comparison as p value < 0.05 for pain intensity and active cervical movement. When between groups comparison was done, there were statistically no significant differences found. Surged faradic current and manual pressure release have got beneficial effect in reducing the pain intensity and increasing the range of motion in patients with Mtrps in upper trapezius.***

Keywords: Myofascial Trigger Point, Surged faradic current,Active cervical movement, Numerical Pain Rating Scale

1. Introduction

Musculoskeletal pain is the major cause of morbidity in the working-age population and is among the leading causes of disability in other age groups[1].Myofascial pain syndrome is characterized by the presence of myofascial trigger points (MTrps), a sensitive spot in a taut band of skeletal muscle, which is painful on compression, generating motion and vegetative alteration[1]. Trigger points can be categorized as either active or latent.Active trigger points are those that can cause pain at rest or with activity of the muscle containing the trigger point.

According to Travell and Simons, a latent trigger point does not cause pain, but may cause restricted movement and weakness of the muscle containing the trigger points[1]. The most accepted hypothesis focuses on the existence of dysfunctional endplates leading to a perpetuated shortening of the muscle[3,4]. Disruption of the sarcoplasmic reticulum, leading to excess calcium in the muscle, has been suggested as an underlying factor[9]. Another theory suggests that MTrps develop in muscle areas where energy supplies are diminished and metabolic activity is high[8]. Moreover, abnormal spontaneous electrical activities have been described at muscle end plates[5].

Studies conducted by C.Z.Hong states that MTrps are sensitive loci in palpable taut band of skeletal muscle fibers, which contains one or two nociceptive nerve ending and distributed highest, near end plate[4].

The major criteria for diagnosis are localized spontaneous chronic pain, tender points in muscles are likely to be myofascial trigger points; non-muscular tender points (clearly not myofascial trigger points, but maybe areas of tenderness referred from such trigger points),palpable band in the longitude of the muscle and reduced possibility of movement[1].The minor criteria are the possibility of reproducing spontaneous pain in the trigger point after multiple pressing and relief of the pain by muscle stretching and by injection into the muscle.Jump sign is a general pain response of the patient with MTrp, who winces, may cry out, and may withdraw in response to pressure applied on a trigger point[1].

Most of the manual therapist for the treatment of MTrps use the technique called manual pressure release or MPR which is otherwise also called ischemic compression or trigger point pressure release[13].It is performed by applying gentle persistent digital pressure against the palpable tissue barrier in the MTrp. Thus, finger pressure applied downward on MTrps tends to lengthen sarcomere that are shortened for any reason and can be responsible for the tension of the taut band. If gentle compression is sustained until the clinician feels the release of tension, this corresponds to a degree of equalization of sarcomere length that can be demonstrated as an increase in range of motion and reduced muscle tension[6].

Electrical muscle stimulation (EMS) in the form of surged faradic current is the application of electrical current to elicit a muscle contraction. Use of EMS for orthopedic and neuromuscular rehabilitation has been given significantly in recent years. Electrical muscle stimulation gives relaxation to spasm. Increased production of endorphins is believed to be a consequence of electrical stimulation. This natural, body generated analgesic is produced normally when the body detects a painful stimulus[8].

Researchers have found that the body may be pooled into increased production of endorphins by non -painful electrical stimulation. The circulatory stimulation is by the "pumping action" of the contracting musculature and there is

enhancement of reticulo- endothelial response to clear the waste products[9,10,11]

There is a lack of evidence proving the efficacy of surged faradic current in MTrps although its effects have been proven in treating muscle spasm due to inflammation and pain gate induced pain relief [7]. Hence, the need is to study the effectiveness of surged faradic current on myofascial trigger point in upper trapezius muscle as with manual pressure release.

Hong CZ (2002) said that the pathogenesis of myofascial trigger points appears to be related to the integration in the spinal cord in response to the disturbance of the nerve endings and abnormal contractile mechanism at multiple dysfunctional endplates. Methods usually applied to treat myofascial trigger point include stretch, massage, thermotherapy, electrotherapy, laser therapy, Myofascial trigger point injection, dry needling, and acupuncture[4].

Travell, Simons (1999) define specific criteria for the diagnosis of trigger points[1].

1) A palpable firm area of muscle referred to as the taut band.
2) A localized spot of exquisite tenderness to manual pressure on the trigger point that can be isolated within the taut band.
3) A characteristic pattern of pain in response to sustained pressure on the trigger point within the taut band. This pain is referred in patterns that are specific to individual muscles.
4) A local twitch of the taut band of muscle when the trigger band is distorted transversely or through the insertion of a needle in the spot.

Aguilera MJ *et al.,* (2009) did a study to determine immediate effect of ischemic compression and ultrasound on MTrps of upper trapezius muscle. This study was a randomized control trial in which 66 volunteers diagnosed with latent MTrps of upper trapezius muscle participated. The study concluded that both treatments were shown to have immediate effect of pain reduction on latent MTrps[15].

Rickards LD (2006) in a systemic review of 23 randomized control trials on effectiveness of non- invasive treatment for myofascial trigger point, concluded that there is significant evidence for short term effectiveness of laser therapy on pain intensity and immediate benefits of Transcutaneous Electrical Nerve Stimulation (TENS). But the evidence for effectiveness of frequency modulated electrical muscle stimulation, high voltage galvanic stimulation and interferential current is limited. Evidence for physical and manual therapies is moderate[16].

Fryer G et al., (2005) studied the effect of manual pressure release on myofascial trigger points in the upper trapezius muscle using a novel pressure algometry on 37 subjects who were randomly allocated into either of treatment (manual pressure release) or control (sham myofascial release) groups. The results showed significant increase in pressure pain threshold of myofascial trigger points in the upper trapezius following manual pressure release but not following sham treatment. The study indicates that manual pressure release may be an effective therapy for myofascial trigger points in the upper trapezius[13].

Rachlin ES (1994) suggested that the most effective technique for electrical stimulation of myofascial trigger points is to increase the electrical stimulus to the point of gentle muscular contraction in cyclic mode which is a passive form of contract relax and recommended duration is 10- 15 minutes of intermittent current which can be surged type of current[17].

Hou et al., (2002) investigated the immediate effects of manual pressure release on pain reduction, MTrp sensitivity and improvement in cervical range of motion in 48 women with upper trapezius MTrps. They concluded that significant change was seen in groups using low pressure for 90 sec, and high pressure for 30 sec and 60 sec[18].

2. Methodology

The study included 40 patients,with unilateral MTrp present in upper trapezius, between the age group 20- 40 yrs, with permission from institutional ethical committee& informed consent was obtained for performance of this study.With simple random sampling technique, 40 patients were recruited from Alva's outpatient department, Moodbidri and Karkala.

The patients were allotted alternatively to group A and group B respectively that is first patient to group A, second patient to group B and so on.
GROUP A - Subjects received surged faradic current, manual pressure release, and sham ultrasound.
GROUP B - Subjects received manual pressure release, sham ultrasound.

3. Selection Criteria

Inclusion Criteria

- Gender- both male and female
- MTrp in unilateral upper trapezius (According to Simons and Travell criteria).
- Decrease in lateral flexion and side rotation to the unaffected side of active cervical movement.
- Willingness to participate.
- Numerical pain rating scale – 5 and more than 5

Exclusion Criteria

Less than 20 yrs
More than 40 years
Surgery or open wounds in the neck and shoulder region within past oneyear.
Skin diseasesand lesions in the area of upper trapezius.
Sensory disturbances present in the upper trapezius.
Duration ofpain less than one month.
Cognitivedeficit.

Patients with MTrp of unilateral upper trapezius muscle were included in the study that fulfils the inclusion criteria, thorough physical and objective evaluation and clinical reasoning process.The base line data were obtained from both groups using Numerical Pain Rating Scale and goniometry measurement for active cervical movement of

lateral flexion and side rotation to the unaffected side of upper trapezius muscle.Treatment was given for one session per day for seven days. Muscle stimulator machine having Faradic current of symmetric, surged biphasic rectangular pulses of duration 0.1-1 microseconds with a frequency of 50 Hertz is givenfor 15 minutes[7,8].

The manual pressure release is sustained for 60 seconds, if the subject reports that the pain decreased to a value of 3 or 4 after 20 or 30 seconds, than pressure is slowly increased to restore the perceived pain to the original value of 7[13]. Subjects of group A and group B both received a home program of self-stretching of upper fibers of trapezius which was taught to the patient.

4. Statistical Methodology

All the statistical analysis was done using SPSS 17 for windows software. Mean was calculated and the measure of dispersion used was standard deviation.The intra group comparison for NPRS[14](Numerical Pain Rating Scale) and active cervical movement(lateral flexion and side rotation on unaffected side) was done by Paired‘t’test while the inter group comparison was done by Independent‘t’ test.

5. Results

Pre and Post-test measurements of intensity of pain and active cervical movement (lateral flexion and side rotation to the unaffected side) were measured using Numerical Pain Rating Scale and universal goniometer respectively for each patient at end of1st and 7th day of intervention respectively.

Table 1: Comparison between 1st and 7th day treatment for pain intensity in Group A

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	5.45	0.887041	27.4769
6.9	1.45	1.0421	0.7868			

Table 2: Comparison between 1st day and 7th day treatment for pain intensity in Group B

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	4.75	1.019546	20.8354
6.65	1.9	1.0815	1.56842			

Table 3: Comparison between 1st day and 7th day treatment for active cervical movement (lateral flexion) in Group A

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	-8.5	2.837716	13.395
35.3	43.8	72.11579	50.90526			

Table 4: Comparison between 1st day and 7th day treatment for active cervical movement (lateral flexion) in Group B

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	-6	2.554665	10.5035
35.85	41.85	94.34474	65.92368			

Table 5: Comparison between 1st day and 7th day treatment for active cervical movement (side rotation) in Group A

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	-6.9	3.024462	10.2027
56.5	63.4	45.94737	20.6736			

Table 6: Comparison between 1st day and 7th day treatment for active cervical movement (side rotation) in Group B

Mean		Variance		Mean difference	Standard Deviation	t value
Pre	Post	Pre	Post	-6.15	3.64583	7.5438
56.25	62.4	39.5657	21.3052			

Table 7: Mean improvement in all the parameters between Group A& Group B

Parameters	Group A	Group B
Intensity of pain	5.36	4.75
Lateral flexion	8.65	6.50
Side rotation	7.05	6.15

The above tables show the improvement in active cervical movement (lateral flexion and side rotation) and Numerical Pain Rating Scale scores after 7 sessions of treatment for both Group A and Group B. It indicates that both the groups’ treatments are effective for the reduction of pain and improving range of motion in patients with MTrp.

An independent‘t’ test was done to find out the significance of the data between the two groups.The results analyzed between groups showed values statistically were insignificant at $p>0.05$, There is statistically no significant difference in efficacies of treatment of A and B.

Except for mean scores of Group A was greater than that of Group B in regards of range of motion and pain intensity.A paired t-test was performed for intra group comparison. ‘p’ value lesser than 0.05 providing evidence that there is significant difference between 1st day and 7th day of treatment at 95% confidence interval. Thus 7th day treatment is more effective than 1st day.

6. Conclusion

This study can be concluded by stating that both groups have got beneficial effect in reducing the pain intensity and increasing the range of motion in patients with myofascial trigger point in upper trapezius. When treatment efficacywere taken into consideration for significance, there was no significant difference between both the groups.

7. Further Scope

As this study was done in patients only with myofascial trigger points inupper trapezius, further studies are suggested to detect in other muscle groups.Further studies should have multiple age groups, as this study was restricted between age group 20-40 yrs.As the study was done for a shorter duration of 7 days treatment, a long term study can be done with increase in treatment duration.

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