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COMPARISON OF ULTRASOUND AND ISCHAEMIC COMPRESSION ON LATENT TRIGGER POINT IN UPPER TRAPEZIUS.

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ABSTRACT

Myofascial trigger point (TrP) is hyperirritable area located in a taut band of skeletal muscle that is painful on compression, gives characteristic referred pain & an autonomic response to a remote area. Trapezius acts continuously to hold the head upright, leading to formation of TrP.To compare effect of ultrasound (US) & ischaemic compression(IC) on latent TrP in upper trapezius. Pretest-posttest experimental group design. 30 subjects were randomly assigned from inclusion criteria in 2 groups, group A (n=15) treated with US & B (n=15) with IC, for 7 days. Outcome measure was feel threshold (TF), pain threshold (TP), pain tolerance threshold (PTT) by using galvanic current. paired and unpaired t test was applied. Both the groups showed improvement ($p<0.00$). Both US & IC are equally effective in treating TrP showing increase in TF,TP,TT and subsequently reduction in pain sensitivity on TrP.

KEY WORDS: Trigger point,Ischaemic compression,Ultrasound.

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INTRODUCTION

Neck pain is one of the most common musculoskeletal complaint[1] and is attributed as the 2nd cause of time off work after low back pain[2]. Simons et al. in 1999 thought myofascial TrPs to be the main cause of neck and shoulder pain. Myofascial pain syndrome contributes 61% of musculoskeletal pain seen by physiotherapist[3].Myofascial TrPs are extremely common yet poorly recognized misdiagnosed and inadequately managed cause of musculoskeletal pain in medical practice. In today's urbanized, fast paced & competitive life the predisposing factor for trigger point formation causing neck pain is lifestyle factors, faulty postures, habits, psychological factor like anxiety, stress, occupational activities, repetitive movements etc[4]. Myofascial Trigger Point (MTrP) has been described as an area of hyperirritability located in a taut band of skeletal muscle that is painful on compression and gives characteristic referred pain, tenderness & an autonomic response to a remote area[5].Myofascial trigger point is identified by the diagnostic criteria led by Simon, these are 1.Presence of a palpable taut band in a skeletal muscle 2.Presence of a hypersensitive tender spot in the taut band. 3.Local twitch response provoked by the snapping palpation of the taut band.4.Reproduction of the typical referred pain pattern of the MTrP due to compression.5.Spontaneous presence of the typical referred pain pattern and/or patient recognition of the referred pain as familiar[3]. 1st four criteria were satisfied, the MTrP considered being latent. If all of the criteria were present, the MTrP was considered to be active[6]. Active TPs are very tender on palpation & associate with existing pain or other dysfunction. Latent TPs are tender on palpation, found in normal persons and are associated with restricted movement (guarding) and weakness/fatigue of the affected muscles without pain. TrPs are activated directly by acute overload, overwork, fatigue, emotional distress, anxiety, direct impact trauma, and radiculopathy[7].

Kell gren (1943) said trigger point in the body are at where blood vessel & nerve lies close to the surfaces. Symptoms manifested are pain, headache, torticollis,disturbance of motor function included muscle weakness, loss of coordination, disturbance of autonomic function included peripheral hypothermia, imbalance, dizziness, tinnitus, sleep disturbance. Physical signs like taut band, tender nodule, pain recognition, local twitch response, jump and shout reactions**,** peau d'orange cutaneous and subcutaneous thickening**,** restricted range of motion, increased muscle tension, muscle shortening, enthesopathic tenderness are seen[8]. Often the muscle required to maintain body posture i.e antigravity muscles are affected. Trapezius being one has to act continuously to hold the head in upright position thus prone for formation of latent trigger point, which with use of inefficient posture like chin forward posture, emotional stress can get activated to become active TrP. Location of TrP in upper trapezius is mid way between C7 spinous process & acromion. Referral zone of pain are side of neck, base of skull,side of the head to reach the temple & back of eye[8]. Various physiotherapy interventions are used as a prophylactic or preventative measure in Latent trigger points. TrPs can be deactivated by temporarily occluding their blood supply and causing a reactive hyperaemia resulting in flushing out inflammatory exudates,breaking scar tissues and desensitizing nerve endings thus reducing muscle tone. Ischeamic compression a manual therapy technique, works on same principle of applying sustained pressure to the TrP and easing the muscle tension. The compression is gradually applied with the finger, thumb, elbow relatively to how much the patient can tolerate and maintained for as long as 90 seconds. Initiating pressure on to a TrP must be done gradually in an effort to minimize increases in tone, to get closer to the core of the trigger point. It is important to reproduce the local twitch response for a better treatment result[5,6].

Ultrasound is an electrical modality often used for treatment of TrP, it generates high frequency acoustic energy using the piezoelectric effect to produce thermal & non thermal effect in tissue. Thermal effect is used to accelerate healing,

extensibility of collagen is increased, and stretching of scar or adhesion is easier following ultrasound, for pain reduction. The longitudinal compression waves of the ultrasonic beams produces compression & rarefaction of cells affecting the movement of tissue fluid in interstitial spaces, thus helps reduce edema. Treatment intensity of 1-2 W/cm^2 gives a desirable therapeutic result**.** Continuous mode is selected for thermal effect to treat general musculoskeletal disorder [9,10,11,12] The importance of identifying trigger point and treat it with appropriate treatment is crucial. There are various physical therapy treatment for treating latent & active TrP which includes TENs, US, LASER, etc and manual therapy like myofascial release, ischaemic compression, muscle energy technique, acupuncture, spray n stretch have been mentioned to be effective. Thus objectives of the study is to find the efficacy of ultrasound, ischeamic compression and then compare the effect of ultrasound and ischemic compression in treatment of myofascial Trigger point in upper trapezius.

MATERIALS AND METHODS

30 subjects (male 04, female 26) were selected from the staff and students of All india institute of Physical Medicine & Rehabilitation, Haji Ali, Mumbai with latent trigger point on upper trapezius, after the approval of ethical committee.Subjects were invited to participate in the study and a verbal consent was taken from them after explaining the procedure of the study. Inclusion criteria were both gender with age above 23 years, with unilateral or/and bilateral upper trapezius latent trigger point as per diagnostic criteria listed by Travell and Simons, No treatment for TrP (medical or physical therapy) received in past 6 month. Subjects were excluded if they had active TrP in trapezius, Fibromyalgia, any cervical injury, pathology or surgery, or any obvious psychological states. Pre-post test experimental group design with simple random sampling technique was used in the study. Outcome measure used was feel threshold, pain threshold and pain tolerance threshold measured by Galvanic current.

Materials used

machine1. Phyaction 787 stimulator- for galvanic current.

2. Rubber electrode and a point electrode,Velcro strap, electrode gel.
3. Ultrasound machine (combination therapy)

Procedure

30 subjects who fit in inclusion criteria were selected. Each subject was assessed and trigger point on upper trapezius was identified and marked by a marker. Subjects were randomly divided into 2 groups:

- **Group A** - Subjects treated with continuous ultrasound in relaxed position, with intensity of 1.5 Watts/cm2 for 5 minutes with frequency of 1 MHz
- **Group B** – Subjects treated with ischemic compression in prone lying with side to be treated stretched slightly by lateral flexion of cervical spine to the opposite side. The upper limb on the side to be treated was placed behind (on the back) and upper limb of the other side was placed under the forehead. Compression was given directly on the marked trigger point. Subjects were instructed to inform once the pain felt on the compression site reduces by 50% of the beginning of procedure [3] and then the compression pressure was gradually increased, over a period of 90 seconds.
- Pain was assess before and after the treatment by using direct current (Galvanic) on marked TrP by a point electrode. The intensity of current was increased & subject was asked to report:
  - When they start feeling the current sensation (TF) ie. Feel threshold.
  - When the current sensation become painful (TP) ie. Pain threshold.
  - When the painful stimulus becomes intolerable (PTT) ie Pain tolerance threshold.

All the 3 readings were documented. A gap of 2 minutes was given before assessing post treatment pain by Galvanic current [3] Treatment was planned for 7 days and the subjects was instructed not to carry out any unaccustomed work like lifting heavy things, straining activities of upper limb etc for those 7 days.

STATISTICAL ANALYSIS

Statistical analysis was done using. An independent t-test was used to compare the changes in the mean score of 1st day Pre treatment and 7th day post treatment for TF, TP, PTT. To compare those changes within group at the end of trial, paired t-test was used. A statically significant difference was defined as p less than 0.05.

RESULTS

Pre and Post intervention mean difference was calculated, feel threshold in US group was 1.8+_1.32 and in IC group was 2.2+_1.14, the pain threshold for US was 6.53+_ 2.64 and for IC group 8.4+-3.64,the pain tolerances threshold for US was 8+_ 5.233 and for IC was 12.26+_4.3. Paired t test applied within the group pre-post showed significant improvement with p<0.00.But when both groups were compared by using unpaired t test it was non-significant for feel threshold t value -0.88 with p>0.38,for pain threshold t value 1.607 with p> 0.119 and for pain tolerance threshold t value -2.391 with p>0.024.

TABLES AND GRAPHS

Table I
Demographic characteristic of the subjects

Variables	Group A (experimental group)	Group B (control group)
Female	13(%)	13 (%)
Male	02 (%)	02(%)
Mean Age (yrs)	27	26.667

Table II
Mean value of day 1 pre treatment & day 7 post treatment for Feel threshold

	Ultrasound	Ischaemic Compression
Pre	3.133	3.133
Post	4.933	5.333
Difference	1.8+_1.32	2.2+_1.14

Graph I

Mean value of day 1 pre treatment & day 7 post treatment for Feel threshold

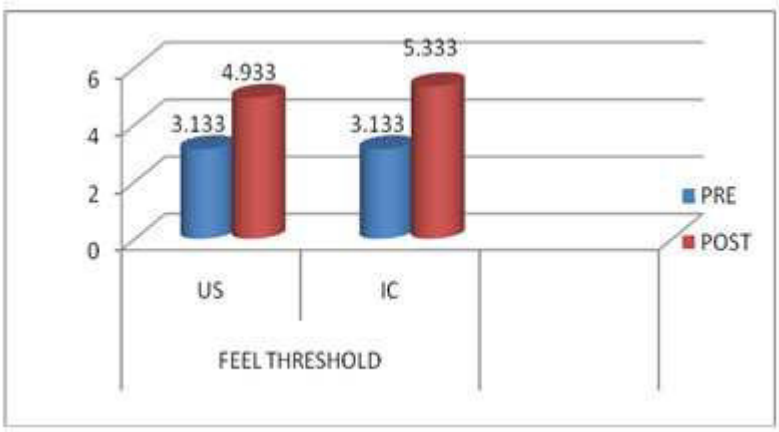


Table III

Mean value of day 1 pre treatment and day 7 post treatment for Pain threshold

	Ultrasound	Ischeamic Compression
Pre	7.666	7.533
Post	14.2	15.933
Difference	6.53+_2.64	8.4+_3.64

Graph II

Mean value of day 1 pre treatment and day 7 post treatment for Pain threshold

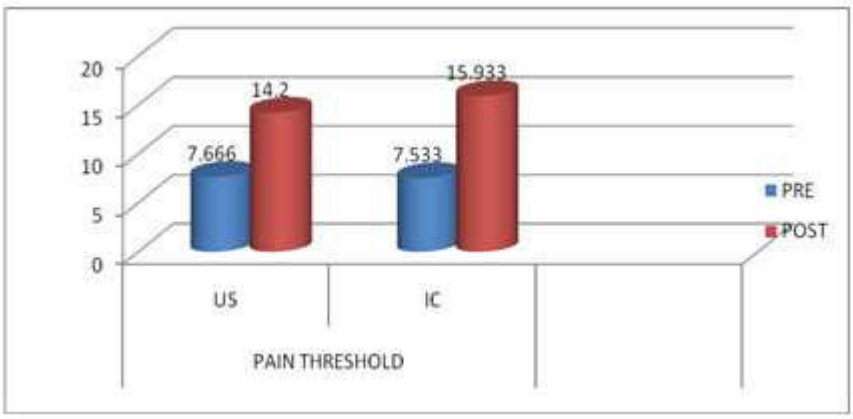


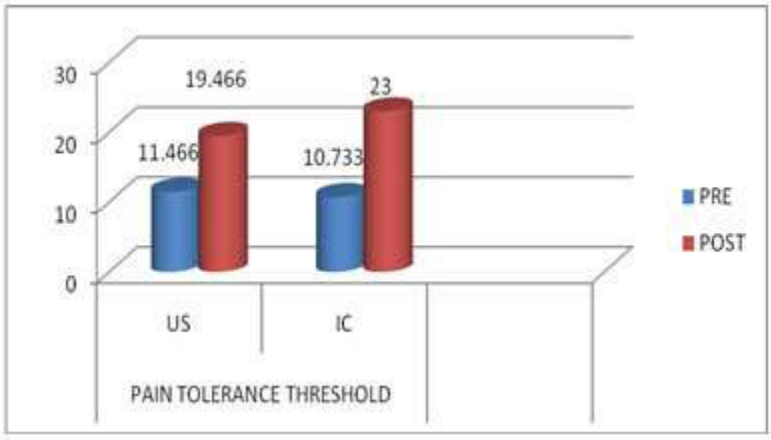
Table IV

Mean value of day 1 pre treatment and day 7 post treatment for Pain threshold

	Ultrasound	Ischaemic Compression
Pre	11.466	10.733
Post	19.466	23
Difference	8+_5.23	12.26+_4.3

Graph III

Mean value of day 1 pre treatment and day 7 post treatment for Pain threshold



DISCUSSION

The study was designed to compare the efficiency of ultrasound v/s ischaemic compression to a latent trigger point on upper trapezius. According to the data analysis, inter group comparison of Ultrasound and Ischaemic compression was non significant i.e both groups showed improvement in form of pain reduction when treated for 7 days. But clinical ischaemic compression showed better result in pain reduction. The result or the improvement obtained in the study can be explained on following basis: Upper trapezius myofascial TrP is form due to sustained sarcomere shortening compromising local circulation, loss of oxygen and nutrient supply in the presence of an increased metabolic demand, thus the energy crisis, this theory was supported by a study done by Larson et al (1990) he measured blood flow in painful upper trapezius & found that myalgia co-related with reduced blood flow[13]**.** Nathan 1982 reported that people who are psychologically tense have an overactive reticular system and they tend to hold certain group of muscles persistently taut, when this happens, trigger points are liable to develop in these muscle[14]. Pain can be interrupted at 4 levels of ascending nociceptive pathway : Peripheral level, Spinal segmental level, Supraspinal level, Cortical level. According to Melzack & Wall's, gate control theory large diameter mechanoceptor produces inhibition of incoming messages of pain at the dorsal horn of spinal cord[15] Ultrasound is believed to work on painful tissues by improving circulation, has micromassage effect, cause alter viscoelasticity of collagen to become more extensible, thus increasing mobility,relieves subcutaneous tightness and thus pain[16].Fischer and Solomon suggest that heating of the skin reduces gamma motor neuron excitability. This would decrease the sensitivity of muscle spindles, which may decrease muscle guarding[17].Ultrasound therapy causes segmental inhibition and physiological blocking by inhibition of activity of small diameter group III & IV fibres before the incoming information ascends and also affects cell permeability and thus reduce the amount of exudates formed in inflammatory process. Therefore pain is modulated at peripheral and spinal segment level by Ultrasound. The study done by Dr. John Z. Srbely et al[(5)] explored the biophysical effects of ultrasound on trigger point pain sensitivity and found beneficial effects of US in tissue healing, both biochemically and biomechanically. US may also play an important therapeutic role in pain modulation, thus ultrasound reduces myofascial Trigger Point Sensitivity[18]**.** Also Farmer WC (1968) investigated effect of varying intensities of ultrasound on conductivity of human motor axon velocity & concluded that the nerve conduction velocity (NCV) is altered by US. Intensity of 0.5

& 3Watt/cm2 increase NCV, whereas intensity of 1,1.5,2 Watt/cm2 decreases NCV therefore theoretically 1 – 2 Watt/cm2 intensity cause decrease in NCV and thus reduces pain[19]. Ischaemic compression causes sustained stretch to a TrP in the muscle right to the tight or restricted area with sufficient force for long enough to slow down the blood supply and force the tension out of the muscle. It stimulate the mechanoreceptor and brings pain relief as well as causes local ischaemic followed by sudden gush of blood to that area on pressure release[20,21,22].This was supported by study done by Hou CR et al(2002),he found the effect of physical therapy modalities like hot packs, active exercise, ischaemic compression, TENs, stretch spray, IFT, myofascial release on MTrP in upper trapezius and concluded that ischaemic compression give immediate pain relief & reduction in MTrP sensitivity whereas others were effective only for pain relief[23]. Hong et al (1993) lends credibility to the statement that ischemic compression is superior to other physical medicine modalities for treating trigger points. He compared spray and stretch, heat packs, ultrasound and ischemic compression and found the latter to be the most effective[24] which contradict this study. The reason can be psychology effect an Indian population has with electrical modalities and heat. Fryer and Hodgson (2005) concluded that ischaemic compression technique was better than sham myofascial technique in reducing tenderness on latent MTrPs in upper trapezius muscle. Also demonstrated decreased in local MTrP tenderness due to change in tissue sensitivity rather than unintentional pressure release by therapist[6]. It can also be explained by the concept of the “Barrier Release” proposed by Lewitt(1991) in which pressure is gradually applied to MTrP until definitive increase in resistance is perceived which is usually perceived as not being painful by subject[25].Local pressure may equalize the lengthen of sarcomere involved in MTrP & consequently decrease pain. The present study demonstrates significant improvement in all 3 thresholds in both groups. But clinical more improvement is seen in ischaemic compression group in comparison to Ultrasound group. Research by Hong et al in 1993 lends credibility to ischemic compression as superior to other physical modalities for treating trigger points. Similar result has been obtained by Jamie Dearing (2007) Limitation and future scope of study were small sample size; lack of definitive amount of pressure to deactivate MTrP, study did not examine effectiveness relative to any other outcome such as functional limitation or disability. The long term effects on the TrP sensitivity needs to be investigated further.

CONCLUSION

Statically both ultrasound and ischaemic compression are equally effective in treating latent TrP as it showed increase in all the 3 threshold and thus subsequently reduction in pain sensitivity but mean difference of ischaemic compression group showed more improvement in thresholds in comparison to ultrasound.Ischaemic compression should be a preferred therapy for Myofascial TrP in a physical therapy setup as it is easily available, accessible, cost effective, non dependent on any machines and results seen in short span of period.

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REFERENCE

1. Cees vos,Arianne Verhagen et al: Management of Acute Neck Pain in general practice:a Prospective study: 2007 Jan British journal of general practice,57:23-28
2. M.lewis,M James: An economic Evaluation of three PT treatments for John Albright et al : Physical therapy 2001 81(10) :1701-1717
3. Simons DG,Dommerholt D.Myofascial trigger points and myofascial pain syndrome: A critical review of recent literature. The Journal of Manual & manipulative therapy 2006; 14:124-176
4. Rachlin ES. Trigger points.In: Rachlin ES ed. Myofascial pain and fibromyalgia: trigger point management.st Louis: Mosby,1994:145-57
5. Janet G Travell & David G Simons.Myofascial pain and dysfunction.The trigger point Manual. USA:Williams & Wilkins,1983.
6. Simons DG,Travell JG,Simons LS.Travell & Simons' Myofascial pain and dysfunction: the Trigger point manual.2ed. Baltimore: Williams & Wilkins, 1999
7. Sola AE, Bonica JJ. Myofascial pain syndromes.In:Bonica JJ.The Management of pain. 2nd ed. Philadelphia: Lea & Febiger, 1990:352-67
8. Baldry P: Myofascial pain syndrome and fibromyalgia Syndromes, A Clinical Guide to Diagnosis and Management Churchill Livingston Elsevier,2001, 1st Ed
9. Edward Bellis Clayton, Angela Forster, Nigel Palastanga ,Clayton's electrotherapy: theory and practice, Baillière Tindall, 1985, 9th ed
10. Valma J. Robertson, Alex Ward, John Low, Ann Reed, Electrotherapy Explained: Principles and Practice, Elsevier Butterworth-Heinemann, 2006,3rd ed.
11. Sheila Kitchen, Sarah Bazin, "Clayton's electrotherapy," Saunders publication, 1996, 10th edition illustrated
12. John L. Echternach:Pain (Clinics in Physical Therapy),vol 12 Churchill Livingstone, March 1987
13. Larsson SE, Bodegard L, Henriksson KG, Oberg PA (1990) Chronic trapezius myal¬ gia Morphology and blood flow studied in 17 patients Acta Orthop Scand 61(5) 394-8
14. Peter E. Baldry: Acupuncture, Trigger Points & Musculoskeletal Pain,Elsevier Churchill Livingstone; 2005, 3rd edtn
15. Leon Chaitow: Muscle energy Techniques: Churchill Livingston Elsevier,2006, 3rd ed :120
16. Peter Bablis et al: Neuro Emotional technique for the treatment of trigger point sensitivity in chronic neck pain sufferers: A controlled Clinical Trial. Chiropractics and osteopathy 2008;16:4(1340-1344)
17. Fischer E, Solomon S: Physiological responses to heat and cold. In: Licht S(ed), Therapeutic Heat and Cold 2ndEd pp 126-1 69. Baltimore, MD:Waverly Press, 1965.
18. Srberly JZ Dickey JP: Randomized Controlled study of the antinocieptive effect of ultrasound on trigger point sensitivity: novel applications in myofascial therapy. Phys Ther 2000.
19. Farmer WC: Effect of intensity of ultrasound on conduction of motor axons. Phys Ther 48:1233-1237, 1968
20. John M Mc partland:Travell Trigger Points-Molecular and osteopathic perspective.Journal of the American osteopathic Association 2004 jun,vol-104, 6,244-249
21. William P Hantel, SharonL Olson et al: Effectiveness of home program of ischeamic Pressure followed by sustained stretch for treatment of myofascial trigger point,physical therapy 2000.
22. Howard Vernon, Barry Kim Humphreys: Chronic mechanical neck pain in adults treated by manual therapy systematic review of change scores in randomized controlled single session. Journal of manual and manipulative therapy, 2008 vol 16(2) 42-52
23. Hou CR et al Immediate effect of various physical therapeutic modalities on cervical myofascial pain and trigger point sensitivity. Archives of physical & medical rehabilitation-2002,82s(10):1406-14
24. Hong C. Z. et al., Immediate effect of various physical medicine on pain threshold of an active myofascial trigger point, Journal of Musculoskeletal pain, 1993;1(2), 37-53.
25. Lewitt,K,1991.Manipulative therapy in rehabilitation of the locomotor system,2nd edition Butterworth Heinemann,oxford.