

A Study to Compare the Effect of Ischemic Compression Technique and Deep Transverse Friction Massage on Upper Trapezius Trigger Point

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Abstract

Objective: The purpose of this study was to compare the effect of Ischemic Compression and Deep Transverse Friction Massage on trigger points in upper trapezius muscle in students. **Methods:** Thirty participants both male and female with myofascial trigger points in upper trapezius muscle were randomly divided into three groups: group A (n=12) received Ischemic compression, group B (n=12) received Deep Transverse Friction Massage and group C (n=12) received active range of motion exercises in all directions. The outcome measures were Neck Disability Index (NDI), Numerical Pain Rating Scale (NPRS) & Range of Motion (ROM) of lateral flexion. The participants were assessed pre-treatment i.e. at the first day of treatment and after the 4 weeks of the treatment i.e. at the last day of the treatment. **Result:** The result showed a statistically significant improvement ($p < 0.05$) in all assessment parameters in pre to post treatment in all groups. But there were no statistically significant improvement showed between the experimental groups in NDI (0.316), NPRS (0.221) & ROM (1.000) in trigger points on upper trapezius muscle. **Conclusion:** This study demonstrated that both Ischemic Compression and Deep Transverse Friction Massage were equally effective in reducing the functional disability and pain & also in improving the range of motion in trigger points on upper trapezius muscle.

Keywords: Myofascial Trigger Points; Ischemic Compression; Deep Transverse Friction Massage.

Introduction

Musculoskeletal disorders are the main cause of disability in the working age population and are among the leading cause of disability in the other age groups [1]. Mechanical neck pain affects 45% male and 54% female of general population at sometime in their life and can result severe disability. Fernandes-de-las-penas et al; found a relationship between the presence of myofascial trigger points and the cervical impairment [2].

A myofascial trigger point is a hyperirritable spots, located within a taut band of skeletal muscle that is painful on compression or on stretch and that can

give rise to a typical motor and sensory component. Motor aspect included disturbed motor function, muscle weakness, muscle stiffness and restricted range of motion. Sensory aspect include local tenderness, referral of pain and peripheral and central sensitization.

Manual therapy is one of the basic treatment option in the management of myofascial trigger points. Myofascial trigger points are treated with manual techniques, spray and stretch. There have been few studies investigating non-invasive treatments for upper trapezius muscle. Trigger points can be treated alone or in combination with electrical muscle stimulation, hot packs, cervical range of motion exercises, ischemic compression, spray and stretch, TENS, sustain stretching, soft tissue mobilization and cervical manipulation [3].

The upper trapezius plays an important role in the mobility and stability of neck. The symptoms seen in people with MTrp could be explained by the energy crisis theory (Simons et al;1999). According to this theory, a sustained contractile activity of sarcomeres increases the metabolic demands and squeezes the rich capillaries network that supply the nutritional

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and oxygen needs of that region and decreased blood flow in the muscle at the site of trigger point. The combination of increased metabolic demand and impaired metabolic supply produces a local energy crisis. The local hypoxia and tissue energy crisis stimulates production of vasoreactive substances which will sensitize local nociceptors causing pain. In the presence of MTrp muscle could undergo early fatigue and put excessive stress on other stabilizing structures [4].

Methods

Study Approach

The participants assessed on the basis of inclusion criteria as trigger point in upper trapezius muscle on dominant side were requested to participate in study. The purpose of study was explained and consent form was taken from each participant. All the participants were assessed using a similar assessment performa and assigned randomly to either of the group.

Inclusion Criteria

1. Age between 19-28 years [5].
2. Both genders male and female.
3. Minimum intensity of pain was 3 out of 10 on Numerical Pain Rating Scale (NPRS) [6].
4. Mechanical neck pain more than 2 weeks [7].
5. On the basis of 5 diagnostic criteria for trigger point given by Simon and Gerwin [7].
6. Unilateral dominant side upper trapezius [8].

Exclusion criteria

1. present with fibromyalgia syndrome.
2. History of any trauma like whiplash injury.
3. History of any cervical spine surgery.
4. Diagnosis of cervical radiculopathy or myelopathy.
5. Presence of any tumors.
6. Presence of recent fracture sites.
7. Neck pain cause by other pathological entities like rheumatoid arthritis, ankylosing spondylitis etc.
8. Any skin disorders.

Study Design

It was an experimental design where participants

were randomly allocated into 3 groups:- Group – A and Group – B were experimental groups & Group – C was control group.

Type of Sample:- Random Sampling

Sample Size

The total number of participants were n=42 (both male and female) out of which 6 participant didn't complete the treatment so the participants which completed the treatment were 36 i.e. 12 in each group.

Setting of the Study

Jyoti Rao Phule Subharti College of Physiotherapy, Swami Vivekananda Subharti University, Meerut, Uttar-Pradesh (U.P), India.

Description of Data Collection Tools

Dependent Variables

- Universal Goniometer.
- Neck Disability Index (NDI).
- Numerical Pain Rating Scale (NPRS).

Tool Used in the Study

- Stationary (pen, paper).
- Hand sanitizer.
- Marker.
- Couch.
- Towel.

Treatment Procedure

Ethical approval was obtained from the board of studies of Jyoti Rao Phule Subharti College of Physiotherapy, Swami Vivekananda Subharti University, Meerut, Uttar-Pradesh (U.P), India.

The trigger point was assessed by 2 ways, one is through palpation which was located in the upper trapezius approximately midway between the 7th cervical vertebrae and the acromion and another by 5 diagnostic criteria given by Simons & Gerwin. Once trigger point located, the skin was marked with an "X".

A basic treatment line were given to all the participants in each group before starting the treatment to relax the muscle i.e. Moist heat pack on cervical region for 10 – 12 min.

Group A (Ischemic Compression)

Therapist Position- Standing behind the Patient

In Ischemic Compression technique, the patient lie in supine position with the cervical spine in lateral flexion in opposite direction. The therapist applied gentle, gradually increasing pressure on the TrP until the finger encounters a definite increase in tissue resistance (engages the barrier). At that point patient feel the discomfort or pain, this pressure is maintained until the discomfort and /or pain eased or therapist senses relief of tension under the palpating finger. The palpating finger increases pressure enough to encounter the new barrier or until the discomfort appeared again. The duration of treatment 90 seconds/cycle for 10 minutes i.e. (total 5 cycles of 90 seconds).

Group B (Deep Transverse Friction Massage)

Therapist Position- Standing behind the Patient

In Deep Transverse Friction Massage (cyriax), the patient’s position was supported sitting with leg on stool, hands on the pillow and back supported on the back rest. This technique was executed in neutral position. The therapist palpated the right spot and placed the middle finger crossed over the index finger and applied friction massage for. The massage was applied slowly with a slight pressure across the fibers. The movement between the patient skin and the physiotherapist fingers should move as one unit. The total duration of treatment 10 minutes with frequent intervals in between.

Group C (Active Rom)

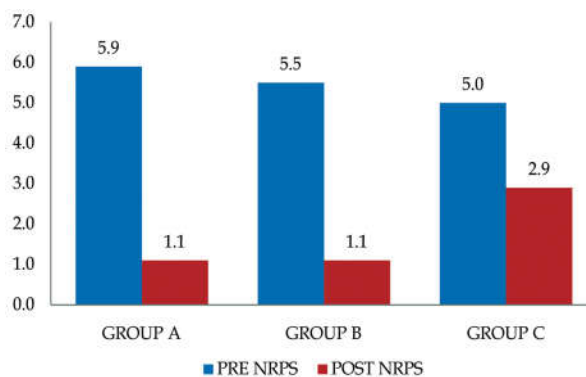
Therapist Position- Sitting in front of the Patient

The patient position was supported sitting on chair, patients performed the active range of motion exercises in all direction i.e. flexion, extension, lateral flexion- right and left, rotation- right and left, 3 sets of 10 repetitions in all direction.

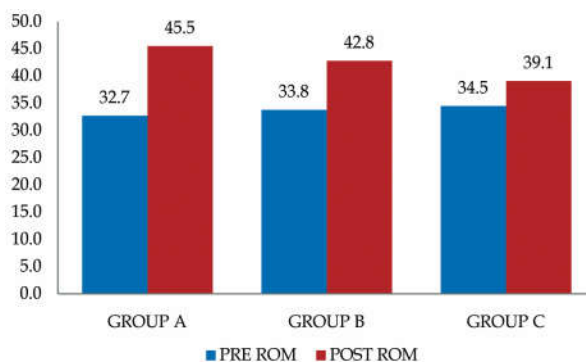
Result

The study compared the efficacy of Ischemic Compression & Deep Transverse Friction Massage to decrease the pain and functional disability & improve the ROM in patient with MTrPs. The result revealed a significant difference in p-value of pre to post reading of NDI for group A, B & C (0.000, 0.000 & 0.013) respectively, NRPS for group A, B & C (0.000,

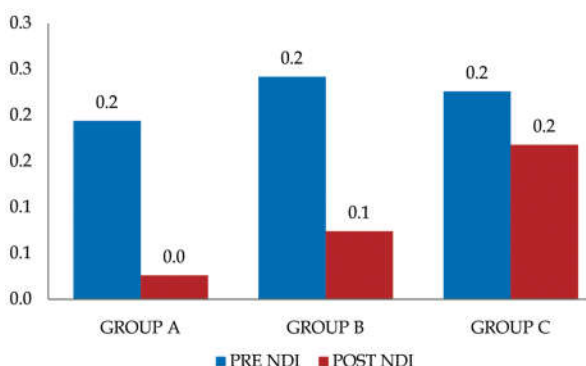
0.000 & 0.001) respectively & ROM for group A, B & C (0.001, 0.004 & 0.006) respectively in all groups. But there is no significant difference found in p-value of post NDI (0.316), NRPS (1.000) & ROM (0.221) between the group A & group B.



Graph 1: The bar chart of average pre & post NRPS scores in three groups



Graph 2: The bar chart of average pre & post ROM scores in three groups



Graph 3: The bar chart of average pre & post NDI scores in three groups

Discussion

The purpose of this study is to find out the comparison between the Ischemic Compression and the Deep Transverse Friction Massage in the subject

with trigger point in upper trapezius muscle. This study demonstrated that ischemic compression and deep transverse friction massage were equally effective to reduce disability, improving range and reducing pain.

The Graph 1 shows an average pre to post NPRS scores for group A, group B & group C. There are other studies that have previously analyzed the effectiveness of the Ischemic Compression technique in the management of MTrPs. Hong et al; 1993 and Simons et al; 2002 reported that the Ischemic Compression give best results in decreasing pain and equalized the length of sarcomere in the involved MTrP. On the other hand Hou et al; 2002 suggested that pain relief from pressure treatment may result from reactive hyperemia in the MTrP region. He also found that a higher pressure applied for 90sec produced the most significant pain relief. Another author Fryer and Hodgson et al; 2005 have demonstrated that the ischemic compression technique is better than sham-myofascial technique in reducing tenderness on latent MTrPs in upper trapezius muscle due to a change in tissue sensitivity rather than any unintentional release of pressure by the practitioner [9].

Hong et al; 1993 hypothesized that Deep Transverse Friction Massage may offer a useful transverse mobilization to the taut band. The another author Stasinopoulos et al; 2004 give a review of Cyriax physiotherapy for tennis elbow and explain theoretically that application of DTF leads to immediate pain relief and increase in strength and mobility. Pain relief during and after DTF may be due to modulation of the nociceptive impulses at the level of the spinal cord the "gate control theory". The centripetal projection into the dorsal horn of the spinal cord from the nociceptive receptor system is inhibited by the concurrent activity of the mechanoreceptors located in the same tissues. According to Cyriax and Cyriax et al; 1983 DTF also leads to increased destruction of pain provoking metabolites, such as Lewis's substances. This metabolite, if present in too high concentration, causes ischemia and pain. It has also been suggested that a 10 minute DTF treatment of a localized area may give rise to lasting peripheral disturbance of nerve tissue, with local anaesthetic effect. Another mechanism is through diffuse noxious inhibitory controls, a pain suppression mechanism that releases endogenous opiates which diminish the intensity of the pain transmitted to higher centre. In addition, the application of DTF can produce therapeutic movement by breaking down the strong cross links or adhesions that have been formed

between the mutual collagen fibres and the adhesions, between repairing connective tissue and surrounding tissues to soften the scar tissue and mobilized the cross links. Finally it produces vasodilatation and increased blood flow to the area which facilitate the removal of chemical irritant and increase the transportation of endogenous opiates, resulting in a decrease in pain [10].

The Graph 2 shows an average pre to post ROM scores for group A, group B & group C. Although Simons et al; 1999 hypothesized that TPs can induce restricted ROM in the tissues and lack of mobility. Fernandez-Perez et al; 2012 found that the number of active TPs in the neck and shoulder muscles in subjects with whiplash-associated disorders was associated with a reduction of cervical ROM in both direction which was improved significantly after treatment with IC. Another study done on soleus TPs with a treatment of pressure release did by Grieve et al; 2011 found that significant improvement in dorsiflexion. Same technique were also used by Sarrafzadeh et al; 2012 & Cagnie et al; 2013 on upper trapezius muscle and found that increase active cervical lateral flexion after the IC treatment. Nagrale et al; 2010 explain three possible reason for the increased ROM after IC i.e. Manual pressure on the contraction knot of the TP causes lengthening of the sarcomere. Decrease of abnormal tension of the taut band and general pain reduction may also contribute to an increased ROM [11].

The Graph 3 shows an average pre to post NDI scores for group A, group B & group C. Few researcher found that ischemic compression and deep transverse friction massage are able to reduce neck disability in trigger points. Cagnie et al; 2013 has demonstrated that a 4 weeks IC treatment resulted in a significant improvement in general neck and shoulder complaints, pain sensitivity, mobility, and muscle strength. At 6-month follow-up, there was a further decrease in general pain, but no change in NDI scores. A possible cause for low NDI score could be the maximum study population present with mild complaints [11]. Another author Hains et al; examined the ischemic compression on shoulder trigger points and found that IC is effective in decreasing functional disability in the shoulder joints.

Most of the study have done on bilaterally on upper trapezius but few of the study says predominantly trigger points developed on dominant side. Hayle and marras et al; 2011 did a study to know the development of MTrPs in upper trapezius, dominant side in computer workers. They explained few reason i.e. location of TPs primarily on medially to spine which put the trapezius into greater risk to develop

fatigue and failure. Unequal loading about a single muscle during low level stress exertion is the another cause to develop TPs which is due to low threshold motor units termed "Cinderella" fibers & location of the motor end plate region (innervated zone) of muscle. They also emphasized the duration of working environment i.e. one hour in which neck, upper posture and vision are compromised which further predispose the TPs development. Lastly they gave importance to modification, not only on ergonomic advice for postural correction but also on micro breaks, task variety and psychological well being program for managing the TPs developments [12].

The result of present study shows a statistically significant improvement that Ischemic Compression and Deep Transverse Friction Massage are equally effective to reduce pain and disability and improve the ROM as compared to the control group. One of the author Fernandez de las penas et al; 2005 which also done the study on MTrPs in upper trapezius, has concluded that transverse mobilization and pressure treatment is effective in reducing tenderness and pain on MTrPs in upper trapezius muscle [13].

Conclusion

A 4 week intervention of Ischemic Compression and Deep Transverse Friction Massage has showed that both the techniques are equally effective in reducing pain and functional disability and improve the ROM in comparison with the control group on trigger points in upper trapezius muscle.

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