Effectiveness of Muscle Energy Technique and Positional Release Technique on Trapezius and Levator Scapulae muscles in Mechanical Neck Pain.

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Abstract -

Background: Upper Trapezius and Levator Scapulae are the most common postural muscles that tend to get shorten leading to restricted neck mobility as they are most frequently used to maintain posture. Positional Release Technique (PRT) and Muscle Energy Technique (MET) are the manual therapy techniques of Osteopathic origin. Their efficacy and effectiveness are under-researched, with little evidence available to guide the practitioners about the most useful and efficious technique to reduce the pain and increase the range of motion. Hence, this study aims at finding out the Effectiveness of Muscle Energy Technique and Positional Release Technique on Trapezius and Levator Scapulae Muscles in Mechanical Neck pain.

Objective: To find out the effectiveness of muscle energy technique and positional release technique in mechanical neck pain. Methods: Sixty five participants with mechanical neck pain were allocated into two groups: Group A: Positional Release Technique (PRT), Group B: Muscle Energy Technique (MET), with twenty eight participants in each group. Pre intervention and post intervention Cervical Range of Motion (ROM) was measured using universal Goniometer and Numerical Pain Rating scale (NPRS) was used to determine the effectiveness of Muscle Energy Technique and Positional Release Technique in mechanical neck pain.

Results: In this study, we found the Pre intervention mean baseline scores of NPRS and ROM for Group A and Group B, when compared to their post intervention scores showed a significant ($p<0.01$) improvement. But there was no significant difference observed in between the groups (group A & group B) after one week of intervention.

Conclusion: Both MET and PRT techniques on Trapezius and Levator Scapulae muscle spasms are equally effective in increasing range of motion and reducing pain in mechanical neck pain.

Key words: Muscle Energy Technique, Positional Release Technique, Trapezius, levator scapulae.

I. INTRODUCTION

Mechanical neck and back pain implies the source of pain is in the spine and its supporting structures, this occurs when one of the joints in the spine loses its normal joint play (resiliency and shock absorption). When a joint develops dysfunction, its normal range of movement may be affected and it can become painful. In addition, joint dysfunction can lead to a muscle imbalance and muscle pain and a vicious cycle. The loss of joint play can cause abnormal signals to the nervous system (there are an abundance of nerve receptors in the joint). The muscles related to that joint can subsequently become tense or conversely, underactive. The resulting muscle imbalance can place increased stress on the joint, aggravating the joint dysfunction that already exists. Upper Trapezius and Levator Scapulae are the most common postural muscles that tend to get shortened leading to restricted neck mobility as they are most frequently used to maintain posture.[1Limited] range of motion and a subjective feeling of stiffness may accompany neck pain, which is often precipitated or aggravated by neck movements or sustained neck postures.[2]

The Positional Release Therapy is a type of manual therapy that may be used effectively in treating chronic and subacute muscle spasm and pain and disability that is often associated with it. PRT relies on precise positioning of dysfunctional tissues in ways that allow a spontaneous response that releases or reduces excessive tension and spasm. By using PRT, the affected muscles and fascial tissues relax. Clinically, it has been found that the first or neuromuscular phase of the PRT treatment lasts approximately 90 seconds for general orthopedic patients and 3 minutes for neurologic patients.[3]

Greenman defines MET as a treatment procedure that involves the voluntary contraction of patient's muscle in precisely controlled direction at varying levels of intensity against a distinctly executed counter force applied by the operator.[4] Literature classifies muscular contractions as isometric and isotonic in nature. Isotonic contraction is further classified as concentric and eccentric.[4] Isometric contraction is the one in which a muscle or muscle groups contract such that a fixed tension develops between the

origin and insertion, maintaining the muscle at a constant length. Here, patient's effort = therapist's effort.[5]

II. SYSTEM MODEL

The study was conducted at Orthopedic Physiotherapy Department College of Physiotherapy, Pravara Rural Hospital, Loni, Maharashtra State, India-413 736.

The participants were informed about the nature of study, intervention performed and written consent was obtained. The variables were collected by the principal investigators.

Inclusion criteria for study were participants between 18-60 years of age presenting with mechanical neck pain. Both the genders included, participants coming with acute (0-6weeks) having mechanical neck pain, participants who had spasm (of upper trapezius & levator scapulae).[6]

The Exclusion criteria for study were: Participants with neck pain which was radiating into upper extremity or associated with headaches or facial pain, diagnosed with serious pathology like Malignancy, Infection, Inflammatory disorder, Vertebral Artery Insufficiency, Osteoporosis, Rheumatoid Arthritis, Tumor, Infection, Sprain and Strain, Tear of muscles, history of fracture of the cervical spine, history of trauma, PIVD, Stenosis, Spondylolisthesis, history of cervical surgery in the last 12 months, diagnosed pregnancy, any deformity (eg.Torticollis, Sprengel‟s deformity, Scoliosis), history of surgery of the cervical spine during the previous 12 months.[6]

Total fifty six participants were recruited for the study. A comparative pre and post intervention measurement design was used to evaluate the differences in pain and ROM. Pain was assessed by asking the patients to quantify their pain on an 11-point Numerical Pain Rating Scale. Range of motion was assessed by using Universal Goniometer

III. PREVIOUS WORK

Mahajan R, Kataria C, Bansal K. They Comparative effectiveness of Muscle Energy Technique and Static Stretching for Treatment of Sub acute mechanical neck pain. They concluded that both the treatment techniques, muscle energy technique and static stretching were effective in alleviating the mechanical neck pain.[6]

Sahem A.M. AL-Shawabka, et. al. They compare the Positional Release Technique Versus Manual Pressure Release on the Upper Trapezius Muscle in Patients with Myofascial Pain Dysfunction Syndrome. And they found that that MPR is more effective than the PRT in relieving pain and improving cervical ROM for the short term effect. [10]

Chaitow L.et al advocates MET as a useful means of treatment for trigger points. He pointed out that Post Isometric Relaxation Technique (PIR) have fairly, conclusively demonstrated the efficiency & state that Post Isometric Relaxation Technique abolished trigger point in muscle, increased the length of shortened muscles, relieved tenderness and pain.[8]

In clinical settings, both muscle energy technique (MET) and positional release technique (PRT) can be used for the management of neck pain. Literature favoures the use of MET and PRT in the management of neck pain. But there is paucity of studies comparing the effectiveness of the two techniques together. Hence, the present study focuses on determining the efficacy of these two techniques in trapezius and levator scapulae in patients with mechanical neck pain.

IV. PROPOSED METHODOLOGY

Participants were subsequently allocated into two groups based on the envelope method.

In Group A - Positional Release Technique as per the assessment of the subjects, in a 10 second of contraction, 3 times in one session for 6 days.

For Trapezius muscle patient is in supine position. The scapula is elevated by taking the shoulder, neck was rotated to the opposite side, extended and side bended to the same side. Fine tuning of the release was done through either neck or shoulder and this position was held for 90 seconds. After the release the patient was put back to the normal position.[7]

For Levator Scapulae muscle patient is in supine. The therapist sits at the head of the table. One hand palpates and controls a slight neck rotation to the same side. The other hand slides under the scapula with fingertips below the inferior angle. Traction the scapula into elevation towards insertion at the C1 through C4 transverse processes. The release can be done with fine tuning of neck. This position was held for 90 seconds. After the release the patient was put back to the normal position. [7]

In Group B:

Muscle Energy Technique as per the assessment of the subjects, 3 times in one session for 6 days. For Trapezius muscle is –The patient lies supine, arm on the side to be treated lying alongside the trunk, neck side bend away

from the side being treated to just short of the restriction barrier, while the practitioner stabilizes the shoulder with one hand cups the ipsiliteral ear / mastoid area, with the other. The patient introduces a resisted effort (20% of available strength) to take the stabilized shoulder towards the ear (a shrug movement) shoulder. The degree of effort should be mild and no pain should be felt. This effort is held for 10 seconds. After contraction and complete relaxation of effort, the therapist gently eases the neck in to an increased degree of side bending before stretching the shoulder away from ear whilst stabilizing the head, to the new barrier of resistance as appropriate.[8]

For Levator Scapulae muscle is - The patient lies supine. The therapist, standing at the head of the table, passes his contralateral arm under the neck to rest on patients shoulder on the side to be treated; the practitioners forearm supports the patients neck. The therapist forearm lifts the neck into full flexion. The head is turned fully into side flexion and rotation away from the side being treated. With the shoulder held caudally by the therapist hand, and the neck in full flexion, side-flexion and rotation. The patients is asked to take the head backwards towards the table, and slightly to the side from which it was turned, against the practitioners unmoving resistance, while at the same time a slight (20% of available strength) shoulder shrug is asked and resisted. The 10 seconds isometrics contraction and complete relaxation of all elements of this combined contraction, the neck is taken to further flexion, side bending and rotation, where it is maintained following the instructions, As you breath out take your shoulder blade towards your pelvis. The stretch is held for 30 seconds.[8]

V. SIMULATION/EXPERIMENTAL RESULTS

Fifty six participants were recruited for the study. Pre and post intervention NPRS and ROM were recorded and data were collated in Microsoft Excel 2007 and analyzed using Graph pad software. In order to compare the reading paired & unpaired t test was used. The mean and standard deviation for the variable was then calculated.

TABLE 1. Pain relief within the two groups on NPRS

Group	Pre intervention	Post intervention (After1week)	t value	p value	Inference
Group A	6.57	3.15	22.88	p < 0.01	Significant
Group B	5.54	3.33	21.85	p < 0.01	Significant

Mean age of participants in group A was 36.04 ± 8.44 years and in group B was 37.14 ± 8.83years. On comparing between the groups, it was observed that there was no statistically significant difference between the two groups in terms of pain assessed on NPRS. (p = 0.0632, t = 1.8972 with df = 54) As shown in table no 1.

Table 2 Difference in cervical ROM among participants in group A

ROM	Pre intervention	Post intervention	t value	p value	Inference
Rotation to left	39.71	45.46	18.37	<0.01	Significant
Rotation to right	39.54	46.54	17.34	<0.01	Significant
Side flexion to the right side	32.79	41.11	10.61	<0.01	Significant
Side flexion to the left side	31.82	37.63	11.62	<0.01	Significant

Table 3 Difference in cervical ROM among participants in group B

ROM	Pre intervention	Post intervention	t value	p value	Inference
Rotation to left	45.00	45.12	13.18	<0.01	Significant
Rotation to right	40.25	47.11	12.19	<0.01	Significant
Side flexion to right side	36.18	40.68	13.68	<0.01	Significant
Side flexion to left side	35.75	38.16	12.16	<0.01	Significant

On comparing between the groups, it was observed that the difference between side flexion range of motion to the right in both the groups was not significant (p = 0.2359, t = 1.1988 with df = 54), it was observed that the difference between side flexion range of motion to the left side in both the groups was not significant (p = 0.5353, t = 0.6239 with df = 54). On comparing rotation range of motion to the right in both the groups was not significant (p = 0.5874, t = 0.5459 with df = 54) it was observed that the difference between rotation range of motion to the left in both the groups was not significant (p = 0.6759, t = 0.4203 with df = 54).

VI .CONCLUSION

PRT techniques work to reduce the hyperactivity of the myotatic reflex arc and to reduce the overwhelming afferent nerve impulses within the arc that may lead to an overflow of neurotransmitter into the associated

dermatome, resulting in referred pain. Reduction in localized spasm increases ROM, decrease pain and allows more normal circulation and improves lymph drainage and increase the potential for more normal biomechanics.[9] By placing the distressed tissue into its most ease, its most comfortable pain free condition it evokes a therapeutically significant physiological response i.e. reduction in tension, nociceptive sensitivity, minimizes the stimulation of the affected proprioceptors and circulatory enhancement which helps to resolve musculoskeletal dysfunction.[7] Baldry (1993) stated that analgesic endorphin and enkephalins are released in local tissue and brain.[10] By holding the tissue in this position for 90 seconds local circulation will improve due to release from the chronic sympathetic stimulation. Local inflammation will decrease as noxious chemicals are carried away.[7] Based on this the explanation for increase ROM in this group perhaps refers to PRT applied 90s on the muscle that have spasm tends to normalize the muscle tone thus lengthen sarcomeres and subsequently permit more free movement and increasing ROM.[10]

The Muscle Energy Technique group also showed marked reduction of pain after the one week of intervention. The reduction in pain due to joint movement and isometric muscle contraction will stimulate joint and muscle proprioceptors. This may produce pain relief according to the Gate-control theory where mechanoreceptor afferents carried by large diameter axons inhibit nonciceptors afferents at the dorsal horn of the spinal cord.[11] MET stimulates joint proprioceptors, via the production of joint movement, or the stretching of a joint capsule, may be capable of reducing pain by inhibiting the smaller diameter nociceptive neuronal input at the spinal cord level. This can be explained by the inhibitory Golgi tendon reflex, activated during the isometric contraction that leads to reflex relaxation of the muscle. Activation of muscle and joint mechanoreceptors leads to sympatho excitation evoked by somatic efferents and localized activation of the periaqueductal gray matter that plays a role in descending modulation of pain.[6]

Bandy et al suggest that MET which maintains muscle elongation for 30 seconds causes an increased muscle length by creep and plastic changes in connective tissue.[11] On the basis of present study, it can be concluded that both MET and PRT techniques on trapezius and levator scapulae muscle spasms are effective in increasing range of motion and reducing pain in patients with mechanical neck pain.

VII. FUTURE SCOPES

Future studies should aim at establishing the long-term effects of applying MET and PRT in patients with various types of neck pain.

REFERENCES

[1] G. Johnson, N. Bogduk, A. Nowitzke, D. House, " Anatomy and actions of the trapezius muscle," Clinical Biomechanics,9(1): 44-50, 1994.

[2] Jhonson G, Bogduk N, Nowitzke A, House D. "Anatomy and Actions of Trapezius Muscles." Clinical Biomechanics, 9(1):40-55, 1994.

[3] Meseguer A, Ferandez A, et.al, " Immediate effects of the strain/counterstrain technique in local pain evoked by tender points in the upper trapezius muscle," Clinical Chiropratice,9:112-118,2006.

[4] DeStefano L. Greenman's Principles of Manual Medicine, cPrinciples of Muscle Energy Technique," 4th edition. Philadelphia: Lippincott Williams & Wilkins, p. 103-108, 2011.

[5] Chaitow L, " Muscle Energy Technique: How to use MET," 3rd edition. Edinburgh: Churchill Livingstone Elsevie,p. 78-108, 2006.

[6] Mahajan R, Kataria C, Bansal K, "Comparative Effectiveness of Muscle Energy Technique and Static Stretching for Treatment of Subacute Mechanical Neck Pain, " International Journal of Health and Rehabilitation Sciences,1(1):16-23, 2012.

[7] Chaitow L, "Positional Release Techniques." 3rd edition, London: Churchill Livingstone Elsevier; 2007.

[8] Chaitow L, "Muscle Energy Technique: How to use MET ," 3rd edition. Edinburgh: Churchill Livingstone Elsevier,p. 178-179, 2006.

[9] Richard N. Pierce, "Positional Release Techniques" www.goeata.org.com.

[10] Sahem A.M. AL-Shawabka, et. al," Positional Release Technique Versus Manual Pressure Release on the Upper Trapezius Muscle in Patients with Myofascial Pain Dysfunction Syndrome". Bull. Fac. Ph. Th. Cairo Univ, 18 (1): 55-61, 2013.

[11] Fryer G, " Muscle Energy Concepts A need for Change" ,J Osteop Med, 3 (2): 54-59, 2000.