Effectiveness of Met and Strain-Counterstrain in Treating Acute Myofascial Upper Trapezius Trigger Points in Patients with Mechanical Neck Pain - A Comparative Study

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ABSTRACT

Introduction: A myofascial trigger point (MTrP) is a hyperirritable spot that can give rise to referral pain, local tenderness, muscle weakness, decrease ROM, peripheral and central sensitization. Manual therapy techniques like M.E.T and strain counter strain have been used in combination to treat upper trapezius trigger points. So the study aimed at comparing the clinical efficacies of these two manual therapy techniques for treating upper trapezius myofascial trigger points in patients with mechanical neck pain.

Methods: 30 participants from MIP College OPD, who met the inclusion criteria were selected and randomly divided into two groups, with each group consisting of 15 participants after obtaining their consent. After baseline examination, the participants were randomized to receive either MET (Group A) or Strain counter strain (Group B). The outcome of interest like Pain intensity via NPRS, cervical lateral flexion ROM via goniometer, and cervical pain, and disability via neck disability index (NDI) were assessed at baseline & at the end of 4 weeks.

Result: MET and Strain-Counterstrain were effective among which MET was significantly more effective in reducing neck pain (Mean 2.20, $p < 0.0001$), increasing cervical lateral flexion ROM (Mean 42.07, $p < 0.0001$), and reducing functional disability (Mean 12.27, $p < 0.0001$).

Conclusion: The study concludes that the Muscle energy technique is more effective than the strain counter strain technique in reducing pain, improving lateral CROM, and reducing neck disability due to upper trapezius trigger points.

Key Words: Mechanical neck pain, MET, Neck Disability, Strain-counter strain, Trigger points

INTRODUCTION

Mechanical neck pain affects 45% to 54% of the general population at some time or the other in their life, which may lead to severe disability.¹ Myofascial trigger point (MTrP) is a hyperirritable spot, located within a taut band of skeletal muscle that's painful on compression or stretch and which can produce typical motor, sensory and autonomic components.² Motor aspects include disturbed motor functions, muscle weakness, muscle stiffness, and restricted range of motion. Sensory aspects include local tenderness, referral pain, and peripheral and central sensitization.³

Currently, many manual and non-manual interventions exist for the inactivation of TrPs. Non-manual interventions include trigger point injections, dry needling, acupuncture,

spray and stretch techniques, and physical modalities like TENS and ultrasound. Manual interventions include Muscle energy techniques, Strain-Counterstrain, manual pressure release, integrated neuromuscular inhibition technique, proprioceptive neuromuscular facilitation techniques, and ischemic compression.⁴

The muscle energy technique (MET) is an osteopathic treatment technique used to lengthen the soft-tissue tightness.⁵ The effective work mechanism of MET is based on the principle of post isometric relaxation in which extends the contracted sarcomeres within the taut band that desensitizes the hypersensitive TrPs and, thus, reduces the pain and muscle tenderness in patients with neck pain.⁶ SCS technique is originated from positional release therapy (PRT) which uses a pain monitor (trigger points, TrP) to look for the position

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of the pain when it's no longer felt at the monitoring point.⁷

Many studies have proved that a combination of M.E.T's and strain counter strain has improved neck pain, ROM, and function due to the upper trapezius trigger point. There were no studies done about the comparative effectiveness between muscle energy technique and strain counter strain and hence the need for study arises to check for a superior form of technology for the treatment of upper trapezius trigger points in patients with mechanical neck pain. This study is directed to compare the effectiveness of these two techniques in upper trapezius pain.

MATERIALS AND METHODOLOGY

A comparative study was done in the physiotherapy department of Maharashtra Institute of Physiotherapy, Latur. Following approval granted by the institutional ethical committee (IEC/2019/UG/13(B)/2019), thirty participants from the out-patient department of MIP Physiotherapy OPD, having mechanical neck pain were selected based on inclusion and exclusion criteria detailed below and were randomly divided into group A and group B of 15 participants each by an independent collaborator by using coin method. A prior written Informed consent was taken from each subject. The study population consisted of both male and female individuals between 18 to 40 years of age, having mechanical neck pain less than 3 months with active unilateral trigger points in the upper trapezius. TrPs are defined as a tender nodule in a taut band that refers to pain beyond the area of contact. Participants were excluded if they were having neck symptoms related to a motor vehicle collision or significant trauma (whiplash injury), having signs of serious pathology (malignancy, infection, inflammatory disorder, or fracture), signs of cervical spinal cord compromise (e.g. diffuse sensory abnormality, diffuse weakness, hyperreflexia, or the presence of clonus), taking pain-relieving medications and history of neck surgery within last 1 year or received trigger point injections in last 6 months. The outcome measures assessed were pain by NPRS which is valid and reliable and extensively used for neck pain (ICC = 0.67)⁸, cervical contra-lateral flexion by universal goniometer and neck disability by neck disability index (ICC = 0.88; [0.63 to 0.95]), at baseline and after 4 weeks.

Group A participants received MET (Lewit's post-isometric relaxation approach). The participant was instructed to lie in the supine lying position. The shoulder was stabilized by the therapist and the other hand was placed on the mastoid area of the affected side shoulder. Head and neck were then side bent towards the opposite side of the affected muscle, flexed and rotated ipsilaterally, just short of their upper trapezius restriction barrier. The participant was asked to shrug the involved shoulder. He was instructed to apply sub-maximal

pain-free effort. The therapist applied an equal and opposite force to counterbalance the patient's force. The isometric contraction was maintained for 7-10 seconds with a normal breathing rhythm. Then the participant was asked to relax and the therapist advanced the stretch placed on the muscle. The stretch was held for 30 seconds. This was repeated 3-5 times per session. Treatment was given 3 times a week for 4 weeks.⁹

Group B participants received strain counter strain technique. The participant was in the supine lying position. Firstly moderate digital pressure was applied to identify the trigger point. The pressure was maintained over the tender point. Then the position of ease was offered to the tender points till the pain was reduced by approximately 70% by positioning the muscle in a shortened/relaxed position, by asking the participant to side bent the head toward the involved side and the therapist positioned the ipsilateral arm in flexion, abduction and external rotation to decrease the reported TrP pain. Once the position of ease was identified, it was maintained for 20-30 s and repeated for three to five repetitions. Treatment was given 3 times a week for 4 weeks.⁹

DATA ANALYSIS

Descriptive statistical data was presented in the form of mean $\pm$ standard deviation and mean difference percentages were calculated and presented. The data were analyzed using paired T-test to assess the statistical difference within the group for the pain, cervical lateral flexion range of motion and neck disability from the pre and post values. An unpaired T-test was performed to assess the statistically significant difference between the groups for the pain, cervical lateral flexion range of motion and neck disability for post values. <0.05 were considered significant. The confidence interval was 95%.

RESULTS

Group A

The mean value and SD of Pretest and posttest of NPRS were 8.27 ± 0.59 and 2.20 ± 0.86 respectively. The mean value and SD of Pretest and posttest of lateral flexion CROM were 14.27 ± 3.49 and 42.07 ± 3.43 , and NDI were 41.80 ± 4.93 and 12.27 ± 2.99 . T-test value for NPRS was 20.20, for lateral flexion CROM was 38.69 and for NDI was 24.80 and the p-value was <0.0001 for all the three outcome measures, these values suggest there is a significant reduction in pain, improvement of lateral flexion CROM and NDI in group A at 4 weeks as shown in table 1 and graph 1.

Group B

The mean value and SD of Pretest and posttest of NPRS for group B were 7.93 ± 0.80 and 4.53 ± 0.92 respectively. The mean value and SD of Pretest and posttest of lateral flexion CROM were 13.53 ± 3.02 and 33.13 ± 3.60 , and NDI were 43.87 ± 7.30 and 20.87 ± 6.13 . T-test value for NPRS was 13.36, for lateral flexion CROM was 14.53 and for NDI was 12.02 and the p-value was <0.0001 for all the three outcome measures, these values suggest there was a significant reduction in pain, improvement of lateral flexion CROM and NDI in group B at 4 weeks as shown in table 2 and graph 2.

Comparison of group A and group B at 4 weeks

The mean with SD of NPRS group A and group B were 2.20 ± 0.86 and 4.53 ± 0.92 respectively. Mean with SD of lateral flexion CROM between group A and group B were 42.07 ± 3.43 and 33.13 ± 3.60 , and NDI were 12.27 ± 2.99 and 20.87 ± 6.13 . T-test value for NPRS was 7.16, CROM was 6.96 and NDI was 4.88. The mean value difference between the two groups for NPRS was -2.33, for lateral flexion CROM was 8.94 and for NDI it was -8.60. The p-value was <0.0001 for all the three outcome measures, these values suggest there was a more significant reduction in pain, improvement of lateral flexion CROM and NDI in group A when compared to group B at 4 weeks post-treatment, as shown in table 3 and graph 3.

DISCUSSION

SCS applied in a shortened position, achieves its advantages using an automatic resetting of muscle spindles which would help to dictate the length and tone into the affected tissues.¹⁰ Pain relief by SCS could have occurred due to the decrease in the intrafusal-extra fusar fibre imbalance and reset of the inappropriate proprioceptive activity.¹¹ TrP ease position (SCS) facilitates 'unopposed arterial filling' leading to reduction of tone in the tissues which results in modification of neural reporting and improved local circulation thus promoting relaxation resulting in a more normal resting length, enhanced circulation, and decreased pain.¹² Strain-Counterstrain technique appears to restore pain-free movement and tissue flexibility thus improving functional restrictions.¹³ Decreases pain sensitivity with the MET could be because of inhibition of Ia and IIa afferents from muscle spindles and Ib afferents from the Golgi tendon organ to the central nervous system.¹⁴ Pain relief from MET may also result from a spinal reflex mechanism for the relief of muscle spasms.¹⁵ It may equalize the length of sarcomeres in the involved MTrP and consequently decrease pain.¹⁶ The effects of the MET component for an increase in CROM post-intervention may be due to changes in muscle stretchability – reflex relaxation, viscoelastic changes, and changes to stretch tolerance. Reflex muscle Relaxation following contraction has been proposed to occur may be due to activation of Golgi tendon organs

and their inhibitory influence on the α -motor neuron pool. A combination of contractions and stretches in MET might be more effective for producing viscoelastic change than passive stretching because greater forces could produce increased viscoelastic change and passive extensibility.¹⁷ Burns and Wells conducted a study to compare the effect of MET on CROM in asymptomatic participants and concluded significant improvements in CROM in all three planes (flexion/extension, side bending, and rotation).¹⁸ Nagrale et al. have shown improvement in PPP after 4 weeks of MET.⁹ Nambi et al. in their study compared the effects of MET and IC on upper trapezius Trp and they found MET to be more effective.¹⁹

CONCLUSION

The study has shown that MET and SCS techniques were effective in decreasing pain intensity and functional disability of the neck and increasing lateral flexion CROM inpatients having mechanical neck pain due to upper trapezius trigger points, however, significant improvement was found in the group which received the Muscle energy technique. So this study concludes that MET is more effective than the SCS technique in decreasing pain intensity and functional disability of the neck and increasing lateral flexion CROM in patients with mechanical neck pain due to upper trapezius trigger points.

LIMITATIONS

- The study had a smaller sample size.
- The study was not gender-specific.
- Occupation of a patient was not considered for the treatment.
- Small study duration
- The generalizability of the findings is limited by the short-term follow-up used in this study and a longer period of follow-up is recommended to determine the lasting effects of this Approach.

SUGGESTION

- The population can be gender-specific.
- The study should be done on a larger number of participants.
- Occupation specific advice and treatment could be administered.
- Study duration can be increased.
- A control group can be included in the study.

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Authors' Contribution:

1. Dr. Gaurav Bhatnagar: Designed the analysis and wrote the paper.
2. Dr. Shital Ghule: Helped in framing results.
3. Dr. ASK Basha: Performed the statistical analysis.
4. Dr. Salim Baburao Sheikh: Collected the data.

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Table 1: Pre-post comparison of outcome measures within group A (MET).

	Mean	SD	t- Test	P Value	Inference
Pre NPRS	8.27	0.59	20.20	<.0001	Significant
Post NPRS	2.20	0.86			
Pre lateral flexion CROM	14.27	3.49	38.69	<.0001	Significant
Post lateral flexion CROM	42.07	3.43			
Pre NDI	41.80	4.93	24.80	<.0001	Significant
Post NDI	12.27	2.99

Graph 1: Pre-Post treatment mean values comparison of outcome measures within group A.

Table 2: Pre-post comparison of outcome measures within group B (SCS).

	Mean	SD	t-Test	P Value	Inference
Pre NPRS	7.93	0.80	13.36	<.0001	Significant
Post NPRS	4.53	0.92			
Pre lateral flexion CROM	13.53	3.02	14.53	<.0001	Significant
Post lateral flexion CROM	33.13	3.60			
Pre NDI	43.87	7.30	12.02	<.0001	Significant
Post NDI	20.87	6.13

Graph 2: Pre-Post treatment mean values comparison of outcome measures within group B.

Graph 3: Comparison of post treatment mean values between group A and group B.

Table 3: Comparison of outcome measures between group A (MET) and group B (SCS) at 4 weeks.

	Mean	SD	Mean Difference between groups (A-B)	t-Test	P Value	Inference
Post NPRS (A)	2.20	0.86	-2.33	7.16	<.0001	Extremely Significant
Post NPRS (B)	4.53	0.92				
Post lateral flexion CROM(A)	42.07	3.43	8.94	6.96	<.0001	Extremely Significant
Post lateral flexion CROM(B)	33.13	3.60				
Post NDI (A)	12.27	2.99	-8.60	4.88	<.0001	Extremely Significant
Post NDI (B)	20.87	6.13				