International Journal of Natural Medicine and Health Sciences
ISSN (Online):2790-2471 ISSN (Print): 2790-2463
Volume 1 (Sup) Aug 2023
Journal homepage: https://journals.iub.edu.pk/index.php/ijnms

Original Research

Efficacy of the muscle energy technique versus the strain-counter strain technique on immediate deactivation of myofascial trigger points in upper trapezius muscle

Ramiza Khalid[a*], Urooj Manzoor[a], Moquddas Gull[a], Iqra Hameed[a], Nawal Farooq[a], Muhammad Usman Khan[a], Hafiz Muhammad Almas Sabir[a]

[a*]Government College University, Faisalabad

Abstract

Aims and objectives: This study aimed to check the comparative efficacy of the Muscle Energy Technique versus the Strain-Counter Strain technique on immediate deactivation of myofascial trigger points in the upper trapezius muscle. Study design: The study comprised a comparative analytical design to compare and contrast the two study interventions. Place and duration of the study: The research was conducted in the Department of Physical therapy, Allied hospital Faisalabad for 6 months. Patients and methods: Based on inclusion and exclusion criteria, 40 subjects were enrolled in the study using the convenient sampling method. The subjects were divided into two groups; group A (n=20) received a single session of baseline treatment with the muscle energy technique, while group B (n=20) received a single session of baseline treatment with the strain-counter strain technique. The subjects were evaluated through the pressure-pain threshold (algometer), Numeric Pain Rating Scale, and Modified Bournemouth Questionnaire as pre-intervention and post-intervention measuring tools for pain and functional status. Results: The data was analyzed using SPSS version 17. Within group analysis showed a significant difference between pre- values and post values of pressure-pain threshold, Numeric Pain Rating Scale and Modified Bournemouth Questionnaire in both groups ($P<0.05$). Between group analysis was done using independent sample t test. It also showed significant difference ($P<0.05$) in post mean values between the two group subjects in all three outcomes. The post-mean values for the strain-counter strain group were slightly more improved than the Muscle Energy Technique group. Conclusion: The strain-counter strain technique is found more effective than the Muscle Energy Technique for immediate deactivation of myofascial trigger points in the upper trapezius muscle.

Correspondence:
Drramizakhalid@gcuf.edu.pk

Keywords: Myofascial Trigger Points, Muscle Energy Technique, Numeric Pain Rating Scale, Pressure Pain Threshold, Strain-Counter Strain

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Citation: Khalid R, Manzoor U, Gull M, Hameed I, Farooq N, Khan MU and Sabir HMA. Efficacy of the muscle energy technique versus the strain-counter strain technique on immediate deactivation of myofascial trigger points in upper trapezius muscle. IJNMS. 2023 1 (Sup): 1-4.

Introduction: Musculoskeletal disorders are one the main contributors to disability among people of working-age and geriatric population [1]. Spinal illness is the most frequent complaint among these disorders (28.1%). Neck pain and lower back pain are the most frequent spinal illness of all referred patients (60.5%); neck pain is perhaps second only to low back pain in terms of prevalence [2]. Although there are several musculoskeletal conditions causing pain in the neck, Myofascial trigger points (TrP) have garnered much research interest in this regard. Myofascial Trigger Points (MTrPs) are localized and hyperirritable spots known as "Knots" that are palpable in taut bands of muscle fibers, tendons, or ligaments. They are the primary cause of cervical discomfort in myofascial pain syndrome (MPS), a common painful muscle illness. On examination, they give rise to the jump sign, local discomfort, and twitch response. Referred pain is the key outcome when these knots are pressed or moved [3]. MTrPs stress and contract muscles, resulting in numbness and weakness that impede movement [4]. Numerous contributing factors may include muscle trauma, constant repetitive motion, poor posture, nutritional deficiencies, insomnia, insufficient exercise or activity, generalized fatigue, hormonal changes (menopause), intense cooling of muscles, psychological issues (depression, anxiety), other pain or inflammatory issues, obesity, and smoking [5]. No single factor contributes to the development of MTrPs. Instead, there are many contributing factors. Often the postural muscles like pelvic girdle muscles, quadratus lumborum, and upper trapezius are primarily affected [3]. Many treatment methods are available in physical therapy for deactivation of MTrPs. These include both manual therapy and electrical therapy. For example, the Ischemic Compression Technique, Muscle Energy Technique, Strain-Counter Strain Technique, Trigger Point Pressure Release Technique, Laser Therapy, Ultrasound Therapy, Electrical Muscle Stimulation etc. According to the suggestion of Simon and Travell, a therapeutic strategy that successfully deactivates tender points should also have a positive impact on the trigger points of other regions [3]. Chaitow also supported this suggestion through clinical evidences and feels that ischemic compression, strain-counter strain, and Muscle Energy Technique are the most efficient manual therapy method for the deactivation of trigger points [6]. Muscle Energy techniques is a form of manual therapy developed by osteopath physicians. It uses muscle energy in type of isometric contraction to relax the muscle acknowledged to be active in prolongation of shortened or contracted muscle. This technique works with direct and active procedure in which patient is also an active part of therapy and works on the modification of the contractile part of muscle [7]. Strain-counter strain is a passive point technique using indirect manipulation aimed toward relieving contractile organ, musculoskeletal pain and related dysfunctions. It uses all three planes of movements, allowing spontaneous change to occur by positioning certain body parts under stretch while others in relaxation which enhances musculoskeletal tissue growth, regeneration and elimination of corporeal dysfunction [8]. Amir et al. worked on the long-term effects of these two therapies and found them beneficial in the treatment of TrPs [9]. For short-term effects, petal et al 2018 evaluate the combined effects of MET and SCS on non-specific low back pain and found both therapies to be equally beneficial [10]. Our study has been the extension of previous studies and designed to determine the efficacy of muscle energy technique versus strain-counter strain technique on immediate deactivation of myofascial trigger points in upper trapezius muscle. The study helped establishing the best possible short-term effective choice for managing MTrPs pain in the neck.

Patients and Methods: The study comprised a comparative analytical design conducted in the Department of Physical therapy, Allied hospital Faisalabad for 6 months. Based on inclusion and exclusion criteria, 40 subjects were enrolled in the study using the convenient sampling method. The subjects were divided into two groups; group A (n=20) received a single session of baseline treatment with the muscle energy technique, while group B (n=20) received a single session of baseline treatment with the strain-counter strain technique. The subjects were evaluated through the pressure-pain threshold (algometer), Numeric Pain Rating Scale, and Modified Bournemouth Questionnaire as pre-intervention and post-intervention measuring tools for pain and functional status in the upper trapezius muscle. The collected data was analyzed using SPSS 17. Descriptive statistics were measured using frequency distribution. The mean values of study groups compared using the independent sample t-test. The level of significance was set at 5% ($P<0.05$).

INCLUSION CRITERIA	EXCLUSION CRITERIA
AGE 25-40 YEARS	Patients other than cervical trigger points issues
ACTIVE MTRPS PRESENT ON PALPATION WITH THEIR CHARACTERISTIC	Patient with history of traumatic or neuropathic cervical disease
PERSISTENT PAIN FOR MORE THAN 4 MONTHS	Patients underwent myofascial trigger point therapy one month prior to the study

Baseline Treatment: Hot pack for 15 minutes and 3 repetitions of passive slow stretching with 10 seconds hold and 10 seconds relaxation.

Muscle energy technique: After baseline treatment, group A received a single session of MET therapy (2 repetitions). The Patients were placed in sitting position and stabilized the affected side with one hand and mastoid area of the affected side with other hand. The head and neck were then flexed toward contralateral side and stretched the upper trapezius muscle to the first resisted barrier. Then, asked patient to resist against the therapist's hand in pain-free range

and 20% of muscle strength. This isometrics resistance is hold for 7-10 seconds by a patient with normal breathing pattern. After relaxation period, take a new resistive barrier of muscle during stretching and again performed same resistance to the patient's effort. This process repeated for three times with isometric contractions of muscle.

Stain-counterstain technique: After baseline treatment, group B received a single session of S-CS therapy (2 repetitions). In this technique position of ease was maintained through positioning the muscle in relaxed and shortened position. This position of ease reduced 70% of pain in muscle. Place the patient in supine line and slightly flexed the head and neck to affected side with both arms closed to the body in extension position. Apply deep pressure on the trigger point of upper trapezius and hold this pressure for 30 seconds and repeat for three times hence the total pressure time is 90 seconds.

Assessment: In this investigation, we took pre-test and post-test values using the Pressure Threshold Meter (WAGNER FORCE DIAL FDK 20). It was employed to measure the Pain Pressure Sensitivity of MTrPs pain in accordance with Fischer's recommendations [11]. The primary trigger point was chosen as the one with the lowest Pressure-Pain Threshold (PPT) rating. The subjects were informed that they would experience some tension on the examined trigger point. They were asked to identify when the pressure turned into pain by saying "yes." The same examiner took three readings in a row, and the average was used in subsequent analyses. According to Fischer, at least a minute passed between each pair of measurements [12]. NPRS was used to rate the pain intensity of the individuals. The subjects were asked to assign a number according to their pain intensity from 0= no pain to 10=worst possible pain. Pre-test and post-test values of Modified Bournemouth questionnaire scores were taken for functional status. The subjects were instructed to make a closest choice for the particular item to assess the true subjective disability.

Results: The data was analyzed using SPSS version 17. Paired sample t test showed a significant difference between pre- values and post values of pressure-pain threshold and Numeric Pain Rating Scale ($P<0.05$) in both groups. Modified Bournemouth Questionnaire also showed a significant difference in scores of Activities of Daily Living, Depression, work affected, control pain, and sleep ($p<0.05$). Between group analysis was done using independent sample t test. It also showed significant difference ($P<0.05$) in post mean values between the two group subjects in all three outcomes. The post-mean values for the strain-counter strain group were more improved than the Muscle Energy Technique

Discussion: Statistical analysis of the study indicates that both interventions have positive effects on immediate deactivation of myofascial trigger points in upper trapezius muscle. However, means of S-CS group were more improved regarding NPRS, PPT, and Modified Bournemouth Questionnaire**.** Therefore, the obtained results after data analysis rejected the null hypothesis and support alternate hypothesis that Strain-counter strain technique is more effective in giving the immediate effects on deactivation of trigger points in upper trapezius as compared to METs. The results support the previous work by Jung et al., where outcomes were in the favor of strain counter-strain technique for immediate effects in deactivating the upper trapezius activity and by that means improving muscle balance and reducing pain sensitivity [13]. Larger effect of S-CS was found regarding pain pressure threshold and active mouth opening in the masseter muscle TrPs release[14] . In another study, S-CS technique showed immediate pain improvement in latent upper trapezius trigger points [15]. S-CS technique is supposed to achieve these benefits by an automatic muscle spindle resetting that can help normalizing the affected muscle tone and length [16]. In a study done by sadria et al., MET technique showed immediate improvement in pain intensity of upper trapezius latent TrPs and active ROM cervical flexion [17]. Nambi et al stated that MET with ultrasound is more effective than the ischemic compression in reducing pain and improving ROM in upper trapezius MTrPs [18]. The study done by Nagrale et al. also supported the MET therapy regarding pain reduction and functional status improvement in subjects with non-specific neck pain[19]. There are various biochemical mechanisms involve in the therapeutic effects of MET such as altered proprioception, change in tissue fluid, motor control and programing, and other neurophysiological changes [20].

Limitations: The presenting study has some limitations. As there is an absence of a true no-treatment group, it was difficult to differentiate the natural course of disorder and the treatment effect. Although the results were statically significant, clinically meaningful results require high level of changes. Lastly, the therapist has no control over the pain medications taken by the study subjects during the course of treatment.

Conclusion: The statical analysis of the study showed that both groups experienced reduction in pain and improvement in functional status after the application of relative interventions. But when the comparison was drawn, the strain-counter strain technique was found more effective than the Muscle Energy Technique for immediate deactivation of myofascial trigger points in the upper trapezius muscle.

Conflict of interest: None

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Table 1: Within and between group analysis of NPRS and PPT for right trapezius

	Within group analysis		**Within group analysis**		**P Value**	**Intergroup analysis**		**P value**
	MET		**S-CS**					
	Mean ± SD (95% CI)		**Mean ± SD (95% CI)**			**MD between PVs**		
	Before	**After**	**before**	**After**		**MET**	**S-CS**	
NPRS	5.95±1.19	3.95±1.19	6.85±0.91	2.95±0.22	<0.001	2.00±0.9	3.90±0.8	<0.001
PPT	1.26±0.35	1.81±0.35	1.04±0.25	2.22±0.27	<0.001	0.55±0.3	1.17±0.4	<0.001

Note- *NPRS= Numeric Pain Rating Scale PPT=Pressure-pain threshold MD= mean difference PV= post values. The values are shown in mean ± standard deviation with 95% confidence interval. P value < 0.05 significant*

Table 2: Within and between group analysis of NPRS and PPT for left trapezius

	Within group analysis MET		**Within group analysis S-CS**		**P value**	**Intergroup analysis**		**P value**
	Mean ± SD (95% CI)		**Mean ± SD (95% CI)**			**Mean Diff. ±SD**		
	Before	**After**	**before**	**After**		**MET**	**SCS**	
NPRS	5.90±1.02	3.95±0.99	6.30±1.13	2.75±0.55	<0.001	1.95±0.8	3.55±1.3	<0.001
PPT	1.33±0.36	1.80±0.34	1.22±0.32	2.27±0.30	<0.001	0.46±0.2	1.04±0.4	<0.001

Note- *NPRS= Numeric Pain Rating Scale PPT=Pressure-pain threshold MD= mean difference PV= post values. The values are shown in mean ± standard deviation with 95% confidence interval. P value < 0.05 significant*

Table 3: Within and between group analysis of Modified Bournemouth Questionnaire

	Within group analysis MET		**Within group analysis S-CS**		**P***	**Intergroup analysis**		**P***
	Mean ± SD (95% CI)		**Mean ± SD (95% CI)**			**Mean Diff. ±SD**		
	Before	**After**	**Before**	**After**		**MET**	**S-CS**	
ADLs	6.15±1.14	3.80±1.15	6.70±1.38	3.15±0.81	<0.001	2.35±0.8	3.55±1.2	0.001
depression	5.95±1.50	4.60±1.23	6.71±1.33	3.60±0.94	<0.001	1.35±1.2	3.10±1.3	<0.001
Work	6.02±1.15	4.10±1.29	6.60±1.04	3.16±0.81	<0.001	2.10±0.7	3.45±0.8	<0.001
Pain	5.65±0.87	3.60±1.14	6.40±1.18	3.45±1.05	<0.001	2.05±0.9	2.95±1.0	0.007
Sleep	6.15±1.42	4.10±1.29	6.95±0.95	3.35±0.93	<0.001	2.04±0.8	3.60±0.7	0.001

Note- *ADLs= Activities of Daily Living MD= mean difference PV= post values. The values are shown in mean ± standard deviation with 95% confidence interval. P value < 0.05 significant*