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Muscle energy technique versus spray and stretch technique on trapezius trigger points in non-specific neck pain

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Abstract
Background: Hyperirritable and palpable nodules called myofascial trigger points (MTPs) develop along taut bands of muscle fibers. The muscles of the neck and shoulders are the most typical sites to find them. The trapezius is the muscle that is most commonly affected. Trigger points in the neck are seen in 85 percent of individuals who visit pain clinics. MPS is most common in people between the ages of 20 and 60, with a high frequency in sedentary people. These can lead to shortened and tight muscles, which in turn will make it harder to move the joints in an appropriate way and might even cause pain.
Purpose: This study was done to examine the impacts of muscle energy technique versus spray as well as stretch technique on trapezius trigger points in patients suffering from non-specific neck pain
Methods: Sixty participants, ranging in age from 20 to 60, were examined for non-specific neck pain caused by trapezius trigger points. Three equal groups were formed by random assignment. The spray and stretch approach was administered three times weekly for four weeks to Group A (n=20). muscule energy technique was administered three times weekly for four weeks to Group B (n=20). Traditional physical therapy was administered to Group C (n=20) three times weekly for a duration of four weeks: Visual Analogue Scale, Neck Bournemouth questionnaire (NBQ), pressure algometry (PPT) and Cervical Range of motion (CROM) were measured at baseline and post treatment.
Results: For participants with active trigger points at upper trapezius, spray and stretch technique as well as MET are the most efficient treatments. Moreover, Spray and stretch technique was effective than other techniques on VAS, BQ, PPT, and CROM.

Keywords: Muscle energy technique, spray and stretch technique, myofascial trigger points

Introduction

Hyperirritable and palpable nodules called myofascial trigger points (MTPs) develop along taut bands of muscle fibers [1], as a result of microtrauma as well as overload [2], The muscle most often impacted is the trapezius [3]. Trigger points in the neck are seen in 85 percent of individuals who visit pain clinics, and they're more prevalent in females than males [4]. MTPs can significantly affect a person's capacity to work and carry out daily tasks, affecting the economy and the productivity of workers. [5] Clinically, active and latent MTrPs are distinguished. Active trigger points are connected with referred pain patterns and induce persistent pain at rest, whereas latent trigger points cause discomfort with palpation and create motion limitation. [6] Chronic pain produced by trigger points is known as myofascial pain syndrome (MPS). It's related to musculoskeletal injuries including muscle spasms, limited range of motion (ROM), and reduced fibers extensibility, as well as vertigo, abnormal sensations, and autonomic symptoms that impact the patient's physical ability [7], physiotherapy program for myofascial pain along with trigger points can involve ultrasound, Transcutaneous electrical nerve stimulation, Muscle Energy Techniques (MET), Spray and Stretch, Low-level laser, High intensity laser, Kinesio-tape, Strain Counter Strain (SCS), 15 Ischemic Compression (IC), Exercise, Instrument-assisted soft tissue mobilization (IASTM), in addition to high-power pain threshold ultrasound. [8]

One active method of manual treatment is Muscle Energy Technique (MET), which does not involve invasive techniques. [9] Previous research on the effects of MET on MTPs in the upper trapezius muscle has demonstrated a number of positive outcomes, including decreased pain, enhanced neck function and ROM, higher activity levels, and a higher pressure pain threshold (PPT). [11]

Muscle energy techniques are a form of alternative medicine that have shown promise in the treatment of chronic pain, injury, and limited ROM in the body's joints [12]. One effective method for treating TRPs is the "spray and stretch" method, which involves applying a vaporized coolant to the affected area in order to loosen and stretch the muscles. Previous research has examined the effects of the spray-and-stretch method on the following: pain intensity, ROM in the neck, individual anxiety levels following a two-week follow-up, PPT, disability in the neck, and the degree to which disability has been reduced. [14]

As a component of a physiotherapy rehabilitation program during the return-to-work phase for ordinary people, the spray-and-stretch technique can help with functional activities, MPS treatment, increasing pain thresholds, preventing future problems like low back pain and neck pain, and enhancing functional activities. No research has compared the efficacy of MET, cold spray, and stretching on trigger points in the upper trapezius muscle. this study was done to compare the impacts of MET, cold spray, and stretching a trigger points in the upper trapezius muscle.

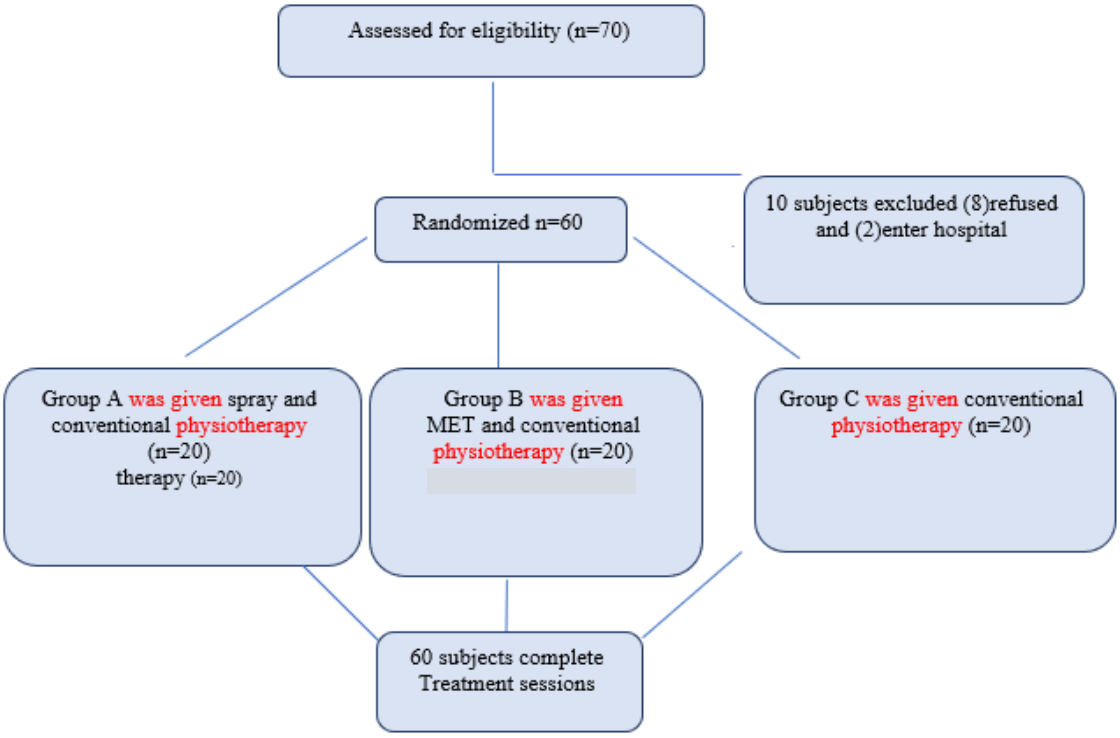
Methods

Design

This was a pre-post randomized experimental trial, this research was performed at BADR Hospital in El Behera The study was done throughout the period from March to July 2024 The protocol was approved by Research Ethical Committee of Faculty of Physical Therapy (No: P.T.REC/012/004430).

Randomization

The subjects were divided into three equivalent groups (A, B, and C). A blinded independent investigators used the statistical package for social science (SPSS) program (version 23 for Windows) to generate random numbers and then opened envelopes that involves the corresponding index cards. Despite randomization, some individuals chose not to continue with the trial.



Flow chart of study participant

Participants

The G-power analysis (version 3.1.9.2) was used to determine the sample size for this study. (Heinrich-Heine-University, Düsseldorf, Germany). The optimal number for this research was sixteen subjects. (32 males and 28 females) . GROUP A (10male and 10 femal) , . GROUP B (9 male and 11 femal), . GROUP C (13 males and 7 females) The minimum required sample size was estimated to be 20 patients per group. Using the VAS score as the primary outcome, this estimation was intended to yield an effect size of 0.19 using an alpha of 0.05 and a power of 90%. Sixty people took part in the study and were selected from the patints at badr hospital Elbehera; both genders participated in this study, with active MTrPs in the upper fibers of the trapezius muscle bilaterally and referred by orthopedic clinics. Participants were provided verbal and written explanations of the aim of the study. They were between the ages of twenty and sixty. They had a Body Mass Index (BMI) between 20 and 30 kg/m².

Outcome Measures

a) Methods measured for assessment

1. **Cervical pain by VAS:** It is a pain rating scale. In order to calculate scores, participants are asked to self-report their pain levels. They do this by placing a single handwritten mark across a 10-centimeter line, which serves as a continuum among either of the ends of the scale, with "no pain" located at the end on the left (0 cm) and "worst pain" located at the right end (10 cm). The patients' pain levels are determined by measuring the distance in millimeters from the left-hand side of the scale to their markings [15].
2. **Pressure pain threshold (PPT) by Pressure algometer:**

- it was measured by raising the pressure by 1 kg/s while the algometer tip was positioned on the trigger point. As soon as the patient complained of pain, the pressure reading was documented in kg/cm [16]. The process was carried out three times with 60-second pauses between each repetition, and the PPT was calculated from the average pressure reading [17].

While holding the algometer in the starting position, the examiner produced an elbow angle of 126°, as determined by a handheld goniometer. For each trial, the investigator would have steadied the algometer with their right hand, making sure it was perpendicular to the force plate, then use their left hand to generate the majority of the force.

3. Measurement of cervical range of motion by CROM device

Each participant sat on a plinth with their knees and hips flexed at a 90-degree angle, feet flat on the floor, and hands resting on top of their legs. The participants were told to "sit in their usual posture and to look directly ahead at an area on the wall," which was taken to mean their everyday position. The positioning of the CROM, which was put on the nasal bridge and ears, was confirmed between each trial. Individuals were asked to flex, extend, and rotate their cervical spines while the vertebral locator arm was palpated for the most movable segment in the cervicothoracic junction area. This was done to find C7. To verify proper spinal alignment, the vertebral locator's built-in bubble inclinometer was utilized [18].

4. Pain intensity and disability by Bournemouth questionnaire

Utilized to evaluate pain levels, impairments in ADLs and social functioning, anxiety, depression, fear avoidance strategies, and the perception of one's own control over pain. Each subject was in a relaxed position and was asked the question in the sheet exactly corresponded to his or her pain.

Completing the test takes apporximately 5 minutes. it involves seven questions. A numeric rating system (NRS) ranging from 0 to 10 is used to evaluate each item. 0= Much better 5= no change 10= much worse**.**

The results of each evaluation are combined. This can result in a score that ranges from 0 (the lowest possible) to 70 (the highest possible). An increased score indicates a more significant influence on the patient's life.

2. Methods measured for treatment

1. Spray and stretch technique: Deep Freeze which was used (ethanol)

It is recommended to apply the spray along the whole length of the muscle, working your way from the trigger point towards the reference zone.

Prior to rewarming the region with moist heat, this method is continued until the muscle group reaches full ROM, with a maximum number of three repetitions.

It takes less than six seconds for each spray pass. It is important to inform patients not to overstretch their muscles following a treatment session**.**

The patient has to be in a relaxed and comfortable position while being supported. Applying hot application to the abdomen.

It is important to anchor just one of the ends of the muscle. By putting their hand beneath their thigh, the patient is able to anchor the acromioclavicular part of the trapezius muscle. The third step is to apply the spray to the skin in 3 or 4 parallel sweeps, following the length of the muscle and involving any referred pain locations. Spray at a 30-degree angle to the skin, keeping 15 cm distance from the region that has to be treated. To achieve a stretch, apply passive pressure to the opposite end of the muscle just after the initial spray pass [13].

Muscle Energy Technique for Upper fiber of trapezius
Patient: The participants were in supine-lying position

Technique: Using one hand, the practitioner supported the affected side's shoulder, whereas the other hand was used to support the affected side's ear as well as mastoid region. Following that, the participant's head and neck were rotated ipsilaterally, flexed, as well as side flexed towards the other side until they were just below the limitation barrier of their upper trapezius muscles. The individuals subsequently submaximally, pain-freely used 20% of their available strength to shrug the stabilized/involved shoulder towards the ear. Maintaining a regular breathing pattern was done while holding the isometric exertion for 7 to 10 seconds. As part of the relaxing process, the head and neck were gradually moved to progressively more stretched positions in order to put more strain on the muscles. Holding each stretch for 30 seconds, this was done 3 to 5 times each session**.**

Dosimetry: The recommended schedule is for three sessions a week, with a minimum of two days off in between. Three sessions for treatment overall. [19]

Statistical analysis
Shapiro-Wilk and Levene's tests for homogeneity of variances were utilized to confirm the normality of the data and assess group homogeneity. The distribution of the data was normal, and the variance was homogeneous. When comparing groups based on all demographic characteristics, one way ANOVAs was used. The effects of treatment on VAS, neck disability, PPT and CROM were investigated using mixed MANOVA. When the MANOVA showed significant results, additional univariate ANOVAs were conducted. For multiple comparisons, post-hoc testing utilizing the Bonferroni correction was done. For all statistical tests, p-value= 0.05 was chosen as the significance level. SPSS version 23 was used.

Results
Demographic Characteristics: Table (1) revealed the patient's characteristics of three groups. There were no statistical significant differences regarding patient's general characteristics between both groups (p-value $\geq$ 0.05).
Mixed design multivariate analysis was done to examine the impact of treatment on the measured variables. There was Statistical Significant difference among groups as as Wilk's A = 0.08, F (24, 92) =10.17, P-value < 0.001, Partial Eta Squared ($\eta 2$) = 0.73. Also there was statistical significant effect on time (pre-post treatment) as Wilk's A = 0.01, F (12, 46) =301.24, p-value < 0.001, $\eta 2$ = 0.99, as well as for the interaction among groups and time as Wilk's A= 0.06, F (24, 92) = 11.43, p-value < 0.001, $\eta 2$ = 0.75.

Between-groups comparison: Baseline and after four weeks of intervention

At baseline, there were no statistically significant differences among three groups in all measured variables (P-value ≥ 0.05) as shown in table (2-3). After four weeks of intervention, a statistically significant differences were observed among both groups A, B and control group at all measured variables with more favor to group A (spray and stretch technique) (P-value < 0.05) as shown in tables (2,3,4).

Within-groups comparison

The findings from both the pre- and post-intervention periods showed statistically significant differences (p-value<0.05) across all groups, with group A (the spray and stretch approach) have the superiority, as can be observed in the table (2-3).

Table 1: Demographic Characteristics of participants (N=60)*

	Group (A)	Group (B)	Control group	p-value
	$\overline{X}$ ±SD	$\overline{X}$ ±SD	$\overline{X}$ ±SD	
Age (years)	42.75±8.31	41.15 ±6.85	40.25±8.83	0.68
Weight (kg)	76±5.79	75.4 ±7.54	76.55±4.51	0.84
Height (cm)	164.6±8.08	163.65±6.72	165.85±7.24	0.64
BMI (kg/m²)	28.23±1.57	28.33±1.26	28.01±1.36	0.96
Gender, n (%)				
Male	8 (40%)	7 (35%)	5(25%)	0.59
Female	12 (60%)	13 (65%)	15(75%)	χ2=1.05

BMI, body mass index; X^2, Chi Square; MD, Mean Difference; * Data are mean± SD for all demographics except gender (%), P-Value < 0.05 indicate statistical significance. Group A (spray and stretch technique). Group B (muscle energy technique).

Table 2: Within and between group analysis for VAS, Neck disability and PPT (N=60)*

Variables	Group (A)	Group (B)	Control group	p-value (between groups)	η^2
VAS (mm)					
Pre-treatment	80.8±4.87	81.25±3.39	80.85±2.66	0.92	
Post-treatment	42.2±4.57	61.6±8.08	70.75±4.02	0.001	0.81
p-value (within-group)	<0.001	<0.001	<0.001		
Neck disability (BQ) (score)					
Pre-treatment	57.25±7.58	58.75±5.67	58.9±5.7	0.67	
Post-treatment	22.05±4.25	34.55±2.87	42.25±4.1	0.001	0.73
p-value (within-group)	<0.001	<0.001	<0.001		
PPT (Trigger point 1 at right side) (kg/cm^2)					
Pre-treatment	2.36±0.58	2.27±0.42	2.33±0.45	0.82	
Post-treatment	4.03±0.31	3.48±0.4	2.69±0.32	0.001	0.74
p-value (within-group)	<0.001	<0.001	<0.001		
PPT (Trigger point 2 at right side) (kg/cm^2)					
Pre-treatment	2.42±0.58	2.45±0.15	2.55±0.17	0.51	
Post-treatment	4.19±0.49	3.65±0.2	2.97±0.22	0.001	0.73
p-value (within-group)	<0.001	<0.001	<0.001		
PPT (Trigger point 1 at left side) (kg/cm2)					
Pre-treatment	2.55±0.32	2.62±0.28	2.66±0.28	0.48	
Post-treatment	4.11±0.33	3.48±0.34	3.14±0.35	0.001	0.6
p-value (within-group)	<0.001	<0.001	<0.001		
PPT (Trigger point 2 at left side) (kg/cm2)					
Pre-treatment	2.41±0.21	2.45±0.2	2.51±0.24	0.33	
Post-treatment	4.18±0.31	3.65±0.3	2.98±0.2	0.001	0.77
p-value (within-group)	<0.001	<0.001	<0.001		

N: number.MD: Mean difference.CI: Confidence interval. P: Probability value. * Data are mean± SD. P-Value ≤0.05 indicate statistical significance difference. VAS: visual analogue scale.cm: centimeter. BQ: Bournemouth questionnaire. PPT: pressure pain threshold. kg/cm^2: kilogram per centimeter square. Group A (spray and stretch technique). Group B (muscle energy technique).

Table 3: Within and between group analysis for cervical range of motion (N=60) *

Variables	Group (A)	Group (B)	Control group	p-value (between groups)	η^2
Cervical flexion (degree)					
Pre-treatment	36.25±6.05	34.45±5.03	35.5±5.76	0.6	
Post-treatment	49.4±4.73	44.55±3.44	40.1±5.27	0.001	0.42
p-value (within-group)	<0.001	<0.001	<0.001		
Cervical extension (degree)					
Pre-treatment	43.6±3.6	42.4±2.68	42.05±2.63	0.24	

Post-treatment	57.6±5.34	53.15±4.99	47.95±4.36	0.001	0.4
p-value (within-group)	<0.001	<0.001	<0.001		
Cervical right side bending (degree)					
Pre-treatment	31.95±5.43	32.1±5	30.6±4.92	0.6	
Post-treatment	43.1±1.92	39.8±3.47	33.8±3.93	0.001	0.6
p-value (within-group)	<0.001	<0.001	<0.001		
Cervical left side bending (degree)					
Pre-treatment	31.3±5.04	30.6±2.91	29.75±4.12	0.62	
Post-treatment	42.4±1.98	39.2±2.21	34.7±4.74	0.001	0.5
p-value (within-group)	<0.001	<0.001	<0.001		
Cervical right rotation (degree)					
Pre-treatment	46±4.44	47.3±4.79	46.15±4.48	0.62	
Post-treatment	62.85±5.4	57.6±5.57	52.25±4.71	0.001	0.42
p-value (within-group)	<0.001	<0.001	<0.001		
Cervical left rotation (degree)					
Pre-treatment	47.45±4.49	45.7±4.03	46.35±6.67	0.56	
Post-treatment	63.25±5.19	58.45±5.09	52.25±4.71	0.001	0.34
p-value (within-group)	<0.001	<0.001	<0.001		

N: number.MD: Mean difference.CI: Confidence interval. P: Probability value. * Data are mean± SD. P-Value ≤0.05 indicate statistical significance difference. Group A (spray and stretch technique). Group B (muscle energy technique).

Table 4: between group analysis of all outcome variables (N=60)

Outcome	Group A versus group B		Group A versus group C		Group B versus group C	
	MD (95% CI)	p-value	MD (95% CI)	p-value	MD (95% CI)	p-value
VAS (mm)						
	-19.4 (-23.96, -14.84)	<0.001	-28.55 (-33.11, -23.99)	<0.001	-9.15 (-13.71, -4.59)	<0.001
Neck disability (BQ) (score)						
	-12.5 (-16.55, -8.45)	<0.001	-20.2 (-24.25, -16.15)	<0.001	-7.7 (-11.75, -3.65)	<0.001
PPT (Trigger point 1 at right side) (kg/cm^2)						
	0.54 (0.27, 0.81)	<0.001	1.34 (1.07, 1.7).	<0.001	0.79 (0.52, 1.06).	<0.001
PPT (Trigger point 2 at right side) (kg/cm2)						
	0.53 (0.3, 0.78)	<0.001	1.22 (0.98, 1.46).	<0.001	0.68 (0.44, 0.92).	<0.001
PPT (Trigger point 1 at left side) (kg/cm2)						
	0.63 (0.36, 0.9)	<0.001	0.98 (0.71, 1.25).	<0.001	0.35 (0.08, 0.61).	<0.001
PPT (Trigger point 2 at left side) (kg/cm2)						
	0.52 (0.31, 0.74)	<0.001	1.2 (0.99, 1.41).	<0.001	0.68 (0.46, 0.89).	<0.001
Cervical flexion (degree)						
	4.85 (1.31, 8.4)	=0.004	9.3 (5.76, 12.85).	<0.001	4.45 (0.91, 8).	=0.009
Cervical extension (degree)						
	4.45 (0.62, 8.28)	=0.02	9.65(5.82, 13.48)	<0.001	5.2 (1.37, 9.03).	=0.004
Cervical side bending right (degree)						
	3.3 (0.79, 5.81)	=0.006	9.3 (6.79, 11.81)	<0.001	6 (3.49, 8.51).	<0.001
Cervical side bending left (degree)						
	3.2 (0.68, 5.72)	=0.008	7.7 (5.18, 10.22).	<0.001	4.5 (1.98, 7.02).	<0.001
Cervical right rotation (degree)						
	5.25 (1.17, 9.34)	=0.007	10.6 (6.52, 14.69).	<0.001	5.35 (1.27, 9.44).	=0.006
Cervical left rotation (degree)						
	4.8 (0.22, 9.38)	=0.04	9.95 (5.37, 14.53).	<0.001	5.15 (0.57, 9.73).	=0.02

N: number.MD: Mean difference.CI: Confidence interval. P: Probability value. * Data are mean± SD. P-Value ≤0.05 indicate statistical significance difference. VAS: visual analogue scale.cm: centimeter. BQ: Bournemouth questionnaire. PPT: pressure pain threshold. kg/cm^2: kilogram per centimeter square. Group A (spray and stretch technique). Group B (muscle energy technique).

Discussion

This study investigated the effects of MET verses spray and stretch technique on upper trapezius myofascial trigger points.

Sixty subjects participated in this study, and were classified randomly into three groups; group A (spray and stretch technique and conventional physical therapy), group B (MET therapy and conventional physical therapy), and group C (conventional physical therapy). It was conducted at Badr hospital in El Behara.

Regarding the results of this study, the spray and stretch technique group revealed significantly greater improvements in all assessed parameters compared to the MET and conventional physical therapy groups. This was evident in the larger percentage reductions in pain (VAS), disability (BQ), and improvements in range of motion (RoM) for all movements.

Regarding the results of the spray and stretch technique, it came in accordance with a comparative study by Magdolin and Shenouda., (2012) which compare between the effectiveness of the post isometric relaxation technique and the stretching exercises on pain intensity, functional disability and range of motion in patients with cervical spondylosis. The study concluded that stretching exercises

were more effective than MET in increasing ROM of cervical flexion and right side bending [27].

The spray and stretch group values in improving neck disability were reported by Shadgan et al., (2015) who confirmed that application of Cold spray on adults age was 37 years; induced a transient change in blood flow and oxygenation of the superficial tissues over the healthy vastus medialis muscle [28].

The spray and stretch group values in improving ROM was confirmed by Bulbuli (2017) study who analyze the effect of spray and stretch technique on thirty subjects affected with trapezitis, between the age group of 18-30 years. The results suggested that ROM and pressure algometer both were significant [29].

There are several possible explanations for this result. First, application of spray and stretch technique alleviates the pain by decreasing nerve conduction velocity. In addition, it acts as a counter-irritant and desensitizes the nociceptors according to pain gait theory. Furthermore, another effect of decrease in pain is due to the release of endorphins from the descending pathways [30].

This study results came in contradiction with Garra et al., (2010) study on patients age more than 18 years old with acute back or neck strains. All patients received 400 mg of ibuprofen orally and then were randomized to 30 minutes of cold pack applied to the strained area. The addition of cold pack to ibuprofen therapy resulted in a mild yet similar improvement in the pain severity, and that pain relief is mainly the result of ibuprofen therapy. This contradiction may be due to small sample size of the study and the diversity in patient symptoms [31].

Regarding the results of MET group results reflected those of Ojoawo et al., (2022) on fifty subjects with mechanical neck pain. The patients were randomized into two groups; MET and Static Stretch (SS) group receiving treatment twice a week for six weeks. Functional disability was lower in MET compared to SS. This study concluded that MET reduces neck disability more than (SS) [32].

The MET group values in improving neck disability were consistent with a recent case study on a 32-year-old female with neck pain has reduced range. The use of reciprocal inhibition techniques with accurate time measurement has led to improvement in the values of functional disability measured by Neck Disability Index and cervical ROM and reduction in pain measured by Numerical Pain Rating Scale [33].

This result may be explained as discussed by Fryer et al., (2010) who hypothesized that the sequence of muscle and joint mechanoreceptor activation elicits firing of local somatic efferent. This in turn leads to sympathy excitation and activation of the periaqueductal gray matter that plays a role in the descending control of pain [34].

This study results came in contradiction with a RCT by Phadke et al., (2016) on sixty patients with mechanical neck pain. they were randomly allocated to either the MET group or static stretching group. Both groups received conventional therapy. They concluded that MET was better than stretching technique in improving pain and functional disability in people with mechanical neck pain. This contradiction can be attributed to different sample size and inclusion criteria [35].

Regarding the conventional therapy group values in improving pain and PPT were consistent with a study reported by Dissanayaka et al., (2016) who showed a significant improvement of neck pain and cervical range of motion following TENS application [36].

The conventional therapy group values in improving ROM were consistent that of (Emshi et al., 2018) who found that TENS techniques are effective at reducing pain and improving functional and pain perception, the AL-TENS approach was superior when evaluating neck lateral bending ROM [37].

The refinement in the control group may be attributed to the instructions that had been given to them to conserving the daily activity within the limit of pain and prevent them from doing hard work. In the same line Huguenin, (2004) stated that the long-term relief of myofascial triggers points pain must involve attention of all perpetuating factors that may lead to shortening of the muscle and formation of trigger points [38].

Limitations of this study

- The psycho-physiological factor which might have interfered with the patient's performance and response
- The variability in the application of spray and muscle energy technique which can affect the consistency of the results.
- Fatigue of subject after treatment and no follow-up done to know the long-lasting effect.

Conclusion

- It can be concluded that spray and stretch technique and muscle energy technique is an effective treatment modality for reducing cervical pain and neck disability in participants having trapezius trigger points in non-specific neck pain.

Conflict of interest

The writers have no conflicts of interest to declare.

Recommendations

Based on the findings of the present study, the following further researchers are greatly recommended:

1. Additional studies to be carried-out to investigate the impacts of spray and stretch technique and MET on latent trigger points.
2. Additional studies to be carried-out to investigate the effects of spray and stretch technique and MET on muscle fatigue.
3. Replicate this study for long period of time to investigate the long-term effects of spray and stretch technique and MET on active trigger points.
4. Replicate this study by combination of spray and stretch technique and MET on the active trigger points.

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References

1. Abbaszadeh-Amirdehi M, Ansari N, Naghdi S, et al. Neurophysiological and clinical effects of dry needling in patients with upper trapezius myofascial trigger points. J Bodyw Mov Ther,2017:21(1):48-52.
2. El Sharnoby AF, Sultan HAM, Saba EKA. Spinal accessory neuropathy in patients with chronic trapezius myofascial pain syndrome. Egypt Rheumatol Rehabil,2020:47(1):28.

3. Ravish VN, Helen S. To compare the effectiveness of myofascial release technique versus positional release technique with laser in patients with unilateral trapezitis. J Evol Med Dent Sci,2014:3(9):2161-2167.
4. Suresh AMR, Kashyap D, Behera TP, Tarsolia AK. Comparison of Ultrasonic Therapy and Ischaemic Compression Therapy in Pain and Tolerance Threshold in Latent Myofascial Trigger Points of the Trapezius Muscle in the Age Group of 20-30 Years. Int J Phys Med Rehabil,2021:9:354.
5. Espejo-Antuñez L, Tejeda J, Albornoz-Cabello M, et al. Dry needling in the management of myofascial trigger points: a systematic review of randomized controlled trials. Compl Ther Med,2017:33:46-57.
6. Bron C, Dommerholt JD. Etiology of myofascial trigger points. Curr Pain Headache Rep,2012:16(5):439-444.
7. Han SC, Harrison P. Myofascial pain syndrome and trigger point management. Reg Anesth,1997:22(1):89-101.
8. Desai MJ, Saini V, Saini S. Myofascial pain syndrome: A treatment review. Pain Ther,2013:2(1):21-36.
9. Waxenbaum JA, Scafidi JM, Lu M. Physiology, Muscle Energy. StatPearls [Internet], 2020. Available from: https://www.statpearls.com/
10. Chaitow L, Crenshaw K. Muscle energy techniques. Elsevier Health Sciences: 2006.
11. Thomas E, Cavallaro AR, Mani D, Bianco A, Palma A. The efficacy of muscle energy techniques in symptomatic and asymptomatic subjects: a systematic review. Chiropr Man Ther,2019:27(1):1-18.
12. Franke H, Fryer G, Ostelo RW, Kamper SJ. Muscle energy technique for non-specific low-back pain. Cochrane Database Syst Rev, 2015, 2.
13. Jaeger B. Myofascial trigger point pain. Alpha Omegan,2013:106(1-2):14-22.
14. Amin DI. Spray stretch technique versus progressive pressure release in the treatment of myofascial pain trigger points: a randomized controlled trial. Int J Physiother Rehabil,2017:5(4):2101-2107.
15. Delgado DA, Lambert BS, Boutris N, et al. Validation of Digital Visual Analog Scale Pain Scoring with a Traditional Paper-based Visual Analog Scale in Adults. J Am Acad Orthop Surg Glob Res Rev, 2018, 2(3).
16. Chang C, Chang K, Chen Y, et al. Electrophysiologic evidence of spinal accessory neuropathy in patients with cervical myofascial pain syndrome. Arch Phys Med Rehabil,2011:92(6):935-940.
17. Fischer AA. Algometry in diagnosis of musculoskeletal pain and evaluation of treatment outcome: an update. J Musculoskelet Pain,1998:6(1):5-32.
18. Dunleavy K, Neil J, Tallon A, Adamo DE. Reliability and validity of cervical position measurements in individuals with and without chronic neck pain. J Man Manip Ther,2015:23(4):188-196.
19. Basak T, Pal TK, Sasi MM, Agarwal S. A comparative study on the efficacy of ischaemic compression and dry needling with muscle energy technique in patients with upper trapezius myofascial trigger points. Int J Health Sci Res,2018:8(2):74-81.
20. Gulick DT. Evidence-Based Interventions for Myofascial Trigger Points. Phys Med Rehabil Res,2016:1(1):41-47.
21. Takamoto K, Bito I, Urakawa S, et al. Effects of compression at myofascial trigger points in patients with acute low back pain: A randomized controlled trial. Eur J Pain,2015:19(8):1186-1196.
22. Amin DI. Spray stretch technique versus progressive pressure release on treatment of myofascial pain trigger point: Randomized controlled trial. IJPR,2017:5:2101-2107.
23. Duarte FCK, West DWD, Linde LD, et al. Re-Examining Myofascial Pain Syndrome: Toward biomarker development and mechanism-based diagnostic criteria. Curr Rheumatol Rep, 2021, 23(69).
24. Michlovitz SL, Bellew JW, Nolan TP Jr. Modalities for Therapeutic Intervention. 5th ed. Philadelphia: F.A. Davis Company, 2012.
25. Shah P, Thaker N, Heimur J, et al. Myofascial trigger point then and now: A historical and scientific perspective. PM R J,2015:7:746-761.
26. Parmar S, Shyam A, Sabnis S, Sancheti P. The effect of isolytic contraction and passive manual stretching on pain and knee range of motion after hip surgery: A prospective, double-blinded, randomized study. Hong Kong Physiotherapy Journal,2011:29(1):25-30.
27. Mishel SM, Shenouda R. Efficacy of stretching exercises versus postisometric relaxation technique on pain, functional disability, and range of motion in patients with cervical spondylosis: A randomized controlled trial. Bull Fac Ph Th Cairo Univ, 2012, 17(2).
28. Shadgan B, Med S, Pakravan AH, Hoens A, Reid WD. Subcutaneous and intramuscular hemodynamics and oxygenation after cold-spray application as monitored by near-infrared spectroscopy. J Athl Train,2015:50(8):800-5. doi: 10.4085/1062-6050-50.6.02.
29. Bulbuli A. Immediate effect of spray and stretch technique on trapezius: An experimental study. J Med Sci Clin Res,2017:5(4):20591-20596. doi: 10.18535/JMSCR/V5I4.139.
30. Jaeger B. Myofascial trigger point pain. Alpha Omegan,2013:106(1-2):14-22.
31. Garra G, Singer A, Leno R, Taira B, Gupta N, Mathaikutty B, et al. Heat or cold packs for neck and back strain: A randomized controlled trial of efficacy. Acad Emerg Med,2010:17(5):484-9. doi: 10.1111/j.1553-2712.2010.00735.x.
32. Ojoawo A, Ige B, Kunnuji K. Muscle energy technique and static stretching in patients with mechanical neck pain – A randomized study. Eur J Clin Exp Med,2022:20:63-69. doi: 10.15584/ejcem.2022.1.9.
33. Jawade S, Chitale NJr, Phansopkar P. The effect of reciprocal inhibition techniques on pain, range of motion, and functional activities in patients with upper trapezitis. Cureus,2023, 15(2). doi: 10.7759/cureus.34487.
34. Fryer G, Fossum C, Christian. Therapeutic mechanisms underlying muscle energy approaches. Sudbury, Mass: Jones and Bartlett Publishers, 2010, 221-229.
35. Phadke A, Bedekar N, Shyam A, Sancheti P. Effect of muscle energy technique and static stretching on pain and functional disability in patients with mechanical neck pain: A randomized controlled trial. Hong Kong Physiotherapy Journal,2016:35:5-11. doi: 10.1016/j.hkpj.2015.12.002.
36. Dissanayaka TD, Pallegama RW, Suraweera HJ, et al. Comparison of the effectiveness of transcutaneous

electrical nerve stimulation and interferential therapy on the upper trapezius in myofascial pain syndrome: A randomized controlled study. Am J Phys Med Rehabil,2016:95(9):663-72.
37. Emshi ZA, Okhovatian F, Kojidi MM, Zamani S. The effects of instrument-assisted soft tissue mobilization on active myofascial trigger points of upper trapezius muscle. J Clin Physiother Res,2018:3(3):133-138.
38. Huguenin L. Myofascial trigger points: The current evidence. Phys Ther Sport,2004:5(2):2-12.