



Efficacy of Muscle Energy Technique versus Myofascial Release in Management of Patients with Cervical Myofascial Pain

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Abstract: **Introduction:** Manual therapies had specific efficacy in management of myofascial syndromes characterized by presence of myofascial trigger points. **Purpose:** to investigate the efficacy of muscle energy technique versus myofascial release in patients with cervical myofascial pain. **Subjects:** Forty five male patients, their age ranged from 30-40 years old, with cervical myofascial pain randomly assigned into 3 groups. **Methods:** experimental Group (A): had received muscle energy technique (post-isometric relaxation), Experimental Group (B) had received myofascial release (progressive pressure release) and Control Group (C) had received the traditional physical therapy rehabilitation program (infrared heat, ultrasound and exercises) 3 sessions/week for 4 weeks. **Assessment:** were performed by electronic digital algometer and Neck disability index prior before and after the completion of the 4 weeks treatment program. **Results:** Paired t-test revealed that there were high significant differences between pre and post treatment of pain pressure threshold ($t=29.86, p=0.001$ & $t=24.61, p=0.001$ and $p=11.16, p=0.001$) and neck disability index ($t=14.28, p=0.001$ & $t=14.01, p=0.001$ and $t=13.74, p=0.001$) within groups as the mean values increased in all 3 groups. ANOVA test revealed a significant difference between the 3 groups for the post treatment value ($F=112.3$ & $P=0.0001$ and $F=43.64$ & $P=0.0001$) respectively. Post Hoc test revealed that group A and group B were improved more than group C. **Conclusion:** muscle energy technique and myofascial release were effective in treating cervical myofascial pain.

Key words: post-isometric relaxation, progressive pressure release, cervical myofascial pain, electronic digital algometer and neck disability index.

Introduction:

Neck pain had become a common complaint in the all inclusive community with an expected lifetime commonness of 67% among adults aged from 20–69 years and an expected cost of 1% of total health consumptions. Neck agony is a typical musculoskeletal problem in the overall public. Although most likely not as regular and handicapping as low back pain, neck pain still constitutes a noteworthy burden on patients as far as pain, disability and absence from work¹.

Myofascial pain is a particular disorder brought on by the presence of trigger points (TrPs) within muscles or their fascia. TrPs were characterized as "spots of tenderness and hyperirritability in muscles or their fascia, confined in tight, palpable bands, which mediate a local twitch response of muscle filaments under a particular sort of palpation – called snapping – and, if adequately hyperirritable, offer ascent to agony, delicacy

and autonomic phenomena and also dysfunction in areas remote from their site, called targets" Myofascial TrPs" can be either active or latent ².

Cervical myofascial agony defined as a mechanical torment found anyplace between the occiput and upper thoracic spine and encompassing muscles with no particular etiology. An often possible seen reason for the neck agony is related to occupational postures, heavy lifting and physically demanding work ³. Muscle energy technique (post isometric relaxation) (PIR) was guaranteed to be a effective technique for acute tension in soft tissue problems that block prompt spinal changes, diminishes muscle spasm that is in charge of spinal fixation, lessens torment and protract the tightened neck muscles to normalize cervical range of movement and is extremely viable for muscles in acute and sub-acute non-specific neck pain. This treatment depends on the mechanism of neuromuscular inhibition ⁴.

Myofascial release (progressive pressure release) (PPR) means a strategy used to enhance range of movement and decrease muscle tension by enlarging the sarcomere inside muscle fiber because of the gradual pressure on the motor trigger point (MTrP) until the specialist feels the release of tension ⁵. Many trials affirmed that treatment of MTrPs was successful in decreasing pressure pain sensitivity. Since advance happened in a few groups in which MTrPs were treated by different manual treatments (spray and stretch, deep pressure, soft tissue knead), additionally studies were required to explore whether manual treatments (post-isometric relaxation and progressive pressure release) had an impact beyond placebo treatment, with accentuation on the utilization of satisfactory treatment strategies. In this way, the immediate, short and long-term impacts of post-isometric relaxation and progressive pressure release on MTrPs had to be examined ⁶.

Nowadays, the viability of manual treatments as treatment for MTrPs had been the subject of great discussion. It is presumably the treatment that had been subjected to the best number of surveys that had reached to varying conclusions, and the one with the most tricky position in the 'suggested treatment arrangements' of national and worldwide guidelines ⁷.

A precise survey investigating the viability of manual treatments (muscle energy technique and myofascial release) in the management of MTrPs found that few reviews had analyzed manual interventions for MTrPs. Follow-up studies had found that progressive pressure release (PPR) is successful in diminishing pain sensitivity on latent and active MTrPs and also torment evoked by active MTrPs in patients with neck pain. Likewise, neuromuscular approaches have appeared to be powerful to reduce torment affectability in latent TrPs⁸.

The utilization of PIR ought not to bring about torment pain thus the contractions should be light (20-30% of quality). The communication between clinician and patient ought to be successful to check whether there was any demonstration of distress. This procedure additionally helped patient to find tension or restriction barrier followed by relaxation of the muscle ⁹.

The utilization of PPR was a sheltered and powerful technique to effectively treat elicited myofascial trigger points. The reason for this technique was to deliberate the blockage of blood in a trigger point area all together toward increase local blood flow. This washed away waste products, supplied important oxygen and helped the affected tissue to heal ¹⁰. Different reviews announced changes in range of movement after treatment with progressive pressure release or a post-isometric relaxation technique of latent TrPs into the masseter muscle. In any case, the confirmation for manual trigger point treatment is inadequate toward making determinations ¹¹.

Manual therapies aimed for enhancing the performance of the cervical muscles, were successful for the decrease of torment and inability, and enhance function related with mechanical neck disorders. It was important for clinicians to enhance the preparation of muscles to best address the patient's key functional deficits. Proper grading of a patient's program was subjected to constant observing of the patient's reaction to treatment as far as change in agony and disability, improvement in functional activities, and change in motor performance. The patient's reaction to tests of cervical muscle function would change as the stage and seriousness of the disorder enhances ¹². So, was there a difference in the efficacy of muscle energy technique versus myofascial release in patients with cervical myofascial pain?

Design of the study:

The design was pre-test post-test control group experimental design. This study was performed in the period from January to May 2016, and ethically approved from the ethical committee of Faculty of Physical Therapy, Cairo University. This study was performed in the out clinic of the faculty.

Subjects, materials and methods:

Forty five male patients, selected from Kasr El Aini Hospital with cervical myofascial pain were involved in the study. Their age ranged from 30 to 40 years old. All patients were diagnosed by an orthopedist as cervical myofascial pain and referred to physical therapy. On examination, patients had moderate to severe cervical disability. Presence of more than two active MTrPs in the sternocleidomastoid, scalene and upper trapezius muscles. Subjects were randomly assigned into two experimental groups and one control group. Experimental Group (A): fifteen patients had received the traditional physical therapy program and post-isometric relaxation. Experimental Group (B) fifteen patients had received the traditional physical therapy program and progressive pressure release. Control Group (C) fifteen patients had received the traditional physical therapy rehabilitation program (infrared heat, ultrasound and exercises). In a pre-test post-test controlled randomized trial for 3 sessions/week for 4 weeks.

Instrumentations:**A. Evaluative Instrumentations:**

- i. Electronic digital algometer: For measuring pain. It was 2015-01-22 12:41 UTC- CP-27 version 1.9c. USA ¹³.
- ii. Neck disability index: For measuring neck disability ¹⁴.

B. Treatment Instrumentations:

- i. Infra-red: For providing superficial heat. It was TU 9444-014-61005106-2009TGKB 941.526.001 RE. Russia.
- ii. Ultra sound: For providing deep heat. It was Frank PTA, BS, CSCS. Canada, K1A 1C1. Its intensity was 1.5 W/cm and frequency of 1 MHz.

Procedures:

A. Trigger point identification: through either a flat palpation technique in which a clinician applies finger or thumb pressure to muscle against underlying bone tissue, or a pincer palpation technique in which a particular muscle is palpated between the clinician's fingers. The following criteria were adopted for the accurate identification of MTrPs ¹⁵.

Essential criteria for trigger point identification:

Palpable taut band: palpation for the taut band, which includes a tender nodule ¹⁶. Exquisite spot tenderness of a nodule: Palpating through a taut band, there were a tender nodular area. Digital compression of the nodule may elicit a referred pain pattern (RPP) ¹⁷. Painful range of motion at the end of range: it is a common characteristic of myofascial trigger points to restrict the range of motion and produce pain at the end of range ¹⁸. This criteria is set for the 3 muscles mentioned before in this study: STCM, scalene and upper trapezius muscles ¹⁹.

B. Treatment for the experimental group A:

- i. Traditional treatment
- ii. Post-isometric Relaxation: the therapist stood behind the patient while relaxed and placed his hand on side of patient's head then takes the agonist muscle to its barrier of tension and holds the position; then provides equal resistance to the patient contracting the agonist muscle with about 30% of their strength (isometric contraction), for 7-10 seconds. Patient then relaxed for around 5 seconds, and as they exhaled, the therapist took the muscle to new restriction barrier with an additional gentle stretch without pain, to a new starting point. This position was

held for 10-30 seconds before the next isometric contraction occurs and is repeated 5–7 times; the whole process was repeated 3 to 5 times. This method was reinforced by controlled respiration ²⁰.



C. Treatment for the experimental group B:

i. Traditional treatment

ii. Progressive Pressure Release Technique: this manual technique required the use of hands or fingers. The technique was performed as follows: the muscle was placed in a position to maximize stretch, but in a relaxed one, then using the thumbs, knuckles or four fingers of one or both hands steady pressure was applied, moving inward toward the center of the MTrP in a slow manner. Once tissue resistance is felt, pressure was stopped and maintained until resistance dissipates, and then when a slow release or a “melting away” sensation of the tissue under the treating fingers is felt, further steady pressure moving again inward toward the center was applied. Once new tissue resistance appears, steady force was maintained against the tissue.

It was applied for at least 30 seconds or until the patient reported that the referral pain had dissipated or up to maximum of two minutes at a time and was repeated 3 to 5 times on each MTrP. Pressure applications vary in quantity and starts from a few ounces up to a couple of pounds and it were guided by the patient’s pain tolerance, where constant feedback was provided by the patient or either by facial expressions. The patient breathed deeply and slowly while pressure was progressively increased ²¹.



D. Traditional treatment for Group C (control group): Include the following treatment:

i. Infra-red: Starting position of the patient was prone lying position with head in neutral position and bare skin while infrared lamp placed above him approximately 70 cm according to the patient's tolerance to heat for 15 minutes ²².

ii. Ultrasound: Researcher placed some aqua gel on crystal head of ultrasonic after making sure that it emits waves normally then adjusted all parameters, then the head moved on patient's cervical region in a slow circular motion for 5 minutes. Patient position was prone lying with his head placed neutrally. The region to be treated was cleaned and bare skin ²³.

iii. Isometric Exercises: the patient was sitting in relaxed position, with good back support. Therapist was standing behind patient and stabilized patient's shoulder with one hand and other hand was placed on either behind, or on forehead, or on opposite side of patient's head according to therapist's command either to extend or flex or side bend patient's head. The therapist must give adequate resistance to avoid any movement of the

treated area. The patient was instructed to hold the head against the therapist's hand for 6 seconds and then asked to relax for 6 seconds. These procedures were repeated five times ²³.

iv. Stretching Exercises: the patient was sitting in a relaxed position with good back support and therapist stood behind the patient supporting the patient head of the tight side by one hand and with the other hand slowly flexing the head and side bending away from supported shoulder in order to stretch the patient's trapezius muscle. Stretching the STCM muscles was done the same way except that patient's head was side bended to the opposite side then rotated towards the tight muscle. Scaleni muscles were also stretched by side bending head to the opposite side then rotated towards the sound side. These positions were held for 30 seconds and then relaxed for another 30 seconds, then repeated for 3 times ²⁴.

Results:

I. Pain pressure threshold:

i) Within Groups:

1- Group (A): Paired t-Test revealed that there was a highly significant difference (t=29.86 and P=0.0001) as the mean values increased from (2.46± 0.2) in pretest to (4.08±0.12) in post-test.

2- Group (B): Paired t-Test revealed that there was a highly significant difference (t=24.61 and P=0.0001) as the mean values increased from (2.42± 0.15) in pretest to (4.1±0.21) in post-test.

3- Group (C): Paired t-Test revealed that there was a highly significant difference (t=11.16 and P=0.0001) as the mean value increased from (2.48± 0.16) in pretest to (3.22±0.19) in post-test as shown in table (1) and figure (1).

Table 1: t-test for pain pressure threshold

	Mean±SD		t-value	p-value
	Pre-test	Post-test		
Group A	2.46±0.2	4.08±0.12	29.86	0.0001*
Group B	2.42±0.15	4.1±0.21	24.61	0.0001*
Group C	2.48±0.16	3.22±0.19	11.16	0.0001*

* Significance

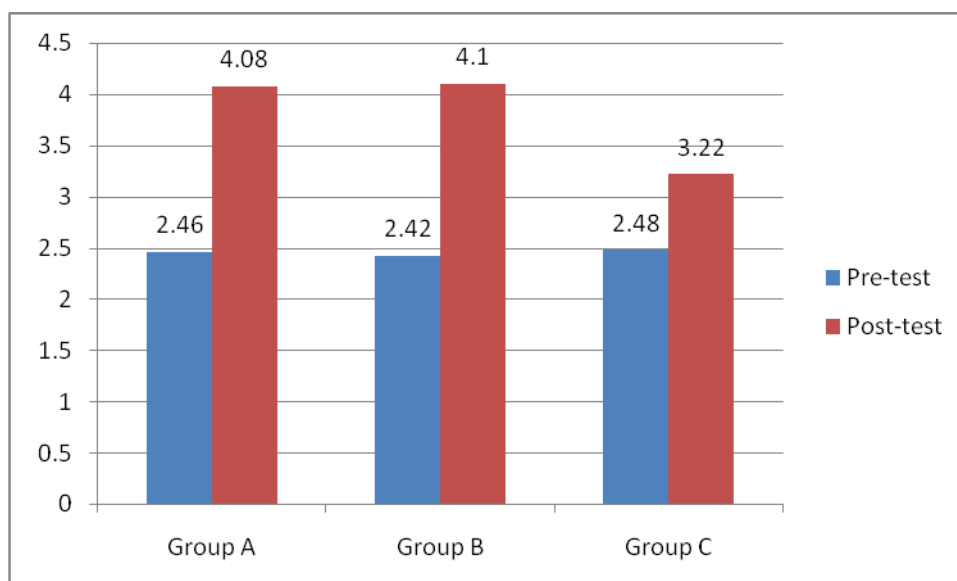


Figure (1): Mean values for pain pressure threshold

ii) Between Groups

ANOVA test revealed that there was no significant difference among the three groups for the pre treatment value ($F= 0.48$ and $P= 0.61$),while there was a significant difference for the post treatment value ($F=112.3$ and $P=0.0001$) as shown in table (2).

Table 2: ANOVA for the three groups for pain pressure threshold

Pain pressure threshold		SS	MS	F	P value
Pre Treatment	Between Groups	0.03	0.01	0.48	0.61
	Within Groups	1.3	0.03		
	Total	1.33			
Post Treatment	Between Groups	7.53	3.76	112.3	0.0001*
	Within Groups	1.4	0.03		
	Total	8.94			

*SS: Sum of Square, MS: Mean Square, P: probability

* Significance

Post-hoc Test for pain pressure threshold:

It revealed that there was a highly significant difference between groups A and B ($MD=0.85$ and $P=0.0001$). There was a highly significant difference between groups A and C ($MD=0.88$ and $P=0.0001$) and finally, there was no significant difference between groups B and C ($MD=0.02$ and $P=0.69$) as shown in table (3).

Table 3: Post hoc test among three groups for pain pressure threshold

Pain pressure threshold	Mean difference	P value
Group A vs. group C	0.85	0.0001*
Group B vs. group C	0.88	0.0001*
Group A vs. group B	0.02	0.69

* Significance

II. Neck disability index:

i) Within Groups:

1- Group (A):

Paired t-Test revealed that there was a highly significant difference ($t=14.28$ and $P=0.0001$) as the mean value decreased from (28.46 ± 4.5) in pretest to (11.26 ± 2.25) in post-test.

2- Group (B):

Paired t-Test revealed that there was a highly significant difference ($t=14.01$ and $P=0.0001$) as the mean value decreased from (28.06 ± 4.47) in pretest to (11.66 ± 2.94) in post-test.

3- Group (C):

Paired t-Test revealed that there was a highly significant difference ($t=13.74$ and $P=0.0001$) as the mean value decreased from (27.8 ± 3.74) in pretest to (20.13 ± 3.48) in post-Test as shown in table (4) and figure (2).

Table 4: t-Test for neck disability index

	Mean \pm SD		t-value	p-value
	Pre-test	Post-test		
Group A	28.46 \pm 4.5	11.26 \pm 2.25	14.28	0.0001*
Group B	28.06 \pm 4.47	11.66 \pm 2.94	14.01	0.0001*
Group C	27.8 \pm 3.74	20.13 \pm 3.48	13.74	0.0001*

* Significance

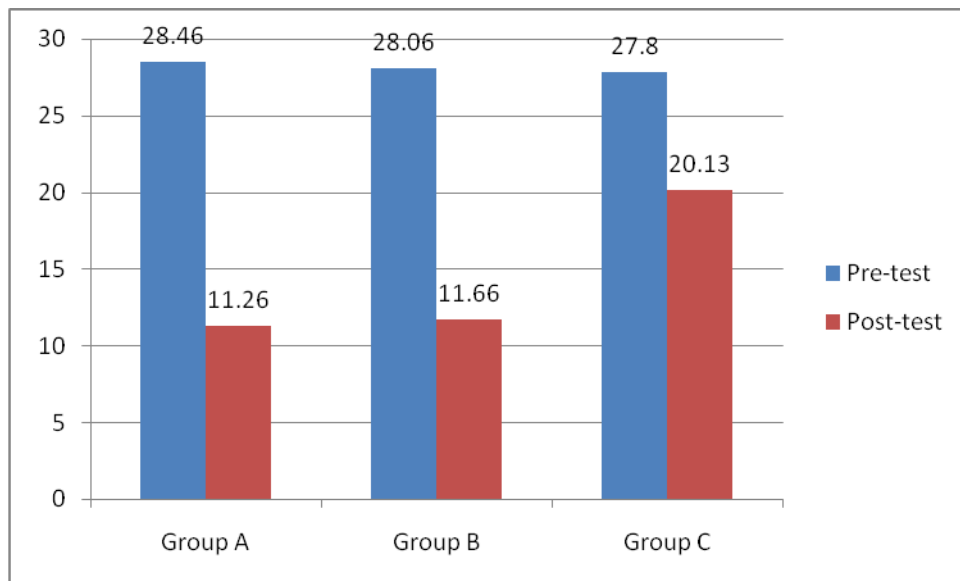


Figure (2): Mean values for neck disability index

ii) Between Groups

ANOVA test revealed that there was no significant difference among the three groups for the pre treatment value (F=0.07 and P=0.92). While there was a highly significant difference for the post treatment value (F=3.42 and P=0.04) as shown in table (5).

Table 5: ANOVA of the three groups for neck disability index

Neck disability index		SS	MS	F	P value
Pre Treatment	Between Groups	3.37	1.68	0.09	0.91
	Within Groups	761.06	18.12		
	Total	764.44			
Post Treatment	Between Groups	752.31	376.15	43.64	0.0001*
	Within Groups	362.0	8.61		
	Total	1114.31			

* Significance

Post-hoc Test for neck disability index:

It revealed that there was a highly significant difference between groups A and C (MD=8.86 and P=0.0001). There was a highly significant difference between groups B and C (MD=8.46 and P=0.0001) and finally, there was no significant difference between groups A and B (MD=0.4 and P=0.71) as shown in table (6).

Table 6: Post hoc test among the three groups for NDI

Neck disability index	Mean difference	P value
Group A vs. group C	8.86	0.0001*
Group B vs. group C	8.46	0.0001*
Group A vs. group B	0.4	0.71

* Significance

Discussion:

The current study showed that there was a statistical significant improvement in pressure pain threshold and functional outcomes measured by neck disability index in both experimental groups as compared to the control group. Despite the fact that, the issue of PIR had tended to a little impact on cervical pain contrasted with lumbar torment²⁵. In addition back muscles react to muscle energy techniques a great deal more fundamentally than neck muscles because of more power applied by the lumbar area²⁶.

Within scope of the present study, the improvement in pressure pain threshold was more in the both experimental groups as compared to the control group. These findings agreed with the research that showed that post-isometric relaxation decreased disability, improved function and improved range of motion in patients with mechanical cervical pain²⁷.

This change in experimental groups conceivably might be because of pain relieving impacts of mobilization and was generally consistent with the proposed mechanisms of action for the post isometric relaxation and its utilization in treatment of somatic dysfunctions that result in cervical movement limitation²⁷. In a later randomized clinical trial, impressive change in the neck disability index was recorded in the groups assigned, yet no significant differences were reported between the groups ($p > 0.05$)²⁸. As opposed to these results, the current study exhibited that the experimental groups had significantly improved in neck disability index ($p < 001$) more than the control group following four weeks of treatment. Since the neck disability index comprises of pain intensity and day by day activities, it was recommended that change in the score might be because of consolidated impacts of reduction in pain and improvement in neck function.

On the other hand, the sample in the late study was comprised of ten subjects while forty five subjects were included in the present study. The later research expressed that vast samples might expand danger of error because of misjudging the outcomes appropriately and more imperative that all subjects would have distinctive reactions to treatment. In addition, large examples would be tedious and significantly more cost effective than littler ones²⁸.

However other researchers disagreed in using post-isometric relaxation techniques in treating patients due to incorrectly mixing it with proprioceptive neuromuscular facilitation (PNF). The primary contrast with the PNF technique was that during the isometric contraction stage the patient applied force against a resistance. Furthermore, during the relaxation stage, the patient's muscle was all the more forcefully stretched and the therapist didn't not really hold up to feel the patient's muscle release which might distress the patient^{29,30}.

Concerning the past researches, it was noticed that number of treatment sessions required for essential change of the experimental groups were less when contrasted with the control group. The vast majority of the subjects of the experimental groups demonstrated change following two weeks. Also, researchers concluded that finishing of the treatment program was fundamental regardless of the possibility that positive outcomes were gotten during the treatment. In addition, the most ideal length for treatment was four weeks^{22,28}.

The current research upheld the utilization of post isometric relaxation for cervical spine to enhance torment and capacities, but additional studies should be possible with more extensive sample incorporating various age groups. Post isometric relaxation could be practiced in the treatment of somatic dysfunctions in the spine, as well as in ribs limits and pelvis. The aftereffects of this study were in concurrence with the discoveries that post isometric relaxation decreases agony, disability, increases ROM and more specially had advantages for patients with cervical my of asocial pain^{18,19}.

Clinically, utilization of progressive pressure release was essential to prevent the onset of central nervous system alterations. Assessing acute and subacute patients for the presence of MTrPs was basic. As progressive pressure release was an extremely agonizing strategy to the patients, a few therapists suggested utilization of gel or oil during its application as a lubricant. In the current research, pressure was directly on top of the MTrP so as to palpate and feel it properly and not to blend it with any other soft tissues underneath the skin³¹.

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