International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067; Impact Factor: RJIF 5.24
Received: 04-11-2018; Accepted: 07-12-2018
www.sportsjournal.in
Volume 4; Issue 1; January 2019; Page No. 01-05

Effect of muscle energy technique and positional release therapy on Quadratus lumborum in sub-acute mechanical low back pain: A comparative study

Dr. Sheetal Rajawadha[1], Dr. Sonal Patole[2], Dr. Mahendra Shende[3]
[1] BPT, Maharashtra University of Health Science, P.E.S. Modern College of Physiotherapy, Pune, Maharashtra, India
[2] BPT, MPT (Paediatrics), Associate professor, P.E.S. Modern College of Physiotherapy, Pune, Maharashtra, India
[3] BPT, MPT, Principal, P.E.S. Modern college of Physiotherapy Pune, Maharashtra, India

Abstract
The purpose of this study was to compare the effectiveness of muscle energy technique and positional release technique on quadratus lumborum along with conventional physical therapy treatment in patients with sub-acute mechanical low back pain. 60 subjects, including both males and females, aged from 18 to 45 years. Assigned randomly into 2 treatment groups. Group A received muscle energy technique and Group B received positional release technique. Pain intensity level and lumbar range of motion was measured using visual analogue scale (VAS), modified Schober test (MST) and finger to floor test (FTFT) respectively pre and post intervention i.e. after 2 weeks intervention. There was significant improvement in both MET and PRT groups. Statistical comparison of the result showed that Group B had greater improvement in pain as compared to Group A. PRT along with conventional treatment appeared to be more effective than MET to reduce sub-acute mechanical low back pain.

Keywords: muscle energy technique (met), positional release technique (PRT), mechanical low back pain, quadratus lumborum

Introduction
Low back pain is usually defined as pain muscle tension, or stiffness localised below the costal margin and above the inferior gluteal folds, with or without leg pain [1]. Low back pain may be classified as mechanical, non-mechanical, psychogenic.
Mechanical pain is the general term that refers to any type of back pain caused by placing abnormal stress and strain on muscle of the vertebral column. Mechanical or non-specific low back pain is the most commonly reported by the population. The life time prevalence of low back pain is reported to be as high as 84%and the prevalence of chronic low back pain is about 23% with 11-12% of the population being disabled by low back pain [2].
Mechanical low back pain may be specific or non-specific according to its duration. Low back pain may be acute (sudden onset and lasting less than 6 weeks), subacute (lasting 6 to 12 weeks) and recurrent (reappears after full periods) [3].
Sub-acute episodes that last up to three months are the commonest presentation of low back pain and recurrent episodes are the norm (Ehrlich, 2003) [4].
The human body has a centre of gravity which keeps the balance between the integrity of structures and protect them against injury in any position standing, sitting or lying down. Non-specific low back pain is characterised by the absence of structural change, nerve root compression, bone or joint injuries. Although there is lack of structural change in non-specific low back pain, it can limit daily activities and cause temporary or permanent inability to work. The incidence of non-specific low back pain is higher in workers subjected to heavy physical exertion, such as weight lifting, repetitive movements, and frequent static posture. Characteristics of no-specific low back pain are heavy pain, worsening with exertion, relived with rest, absence of neurological and muscle contraction, and antalgic posture associated with inactivity and poor posture [3] typically, mechanical pain results from bad habits, such as poor posture poorly designed seating and incorrect bending and lifting motions it may be specific or non-specific.
There are number of low back muscle that can cause back pain. Potential cause of back pain is quadratus lumborum· It originates from iliac crest and iliolumbar ligament and insert over Last rib and transverse processes of lumbar vertebrae. and the Arterial supply is lumbar arteries, lumbar branch of iliolumbar artery. Nerve supply is the 12th thoracic and first through fourth ventral rami of lumbar nerves (T12, L1-L4). Function essential quadratus lumborum contributes to the stabilization and movement of the spine and the pelvis. A bilateral contraction leads to an extension of the lumbar vertebral column when the muscle is only activated on one side, the trunk is bent towards that direction (lateral flexion) [5].
The quadratus lumborum muscle is a common source for pain in the lower back. This is because the QL muscle attaches to both the spine and the pelvis and therefore is regularly involved in daily activities. Due to the muscle's position, it often has to take over some of the excess strain from other muscles, which can result in fatigue. When the muscle is placed in an over-stretched and loaded position for a long period of time, it will eventually start to spasm, which can cause pain [6].
The quadratus lumborum trigger points also play a prominent role in low back pain.

There are four potential trigger points in the quadratus lumborum (QL) muscle
1. The upper QL trigger point- Lateral to where the lumbar spinal muscle and 12th rib meats approach from lateral side to contact it directly.
2. The middle trigger point- Next to 3rd and 4th lumbar vertebrae.
3. Lower -Iliac crest.

Quadratus lumborum pain

It is intense and deep ache

- Upper trigger point- flank region of low back along, crest of hip and around the front of upper groin region.
- Middle trigger point- refers pain and tenderness to SI joint and lower buttock region.
- Lower trigger point- hip joint region and lying on that side during sleeping [6].

The quadratus lumborum trigger point causes

- Severe, deep, aching low back pain during movement or rest, and in nearly any position, but worse in the upright posture of standing or sitting.
- A sharp, knifelike pain when moving the hips/pelvis is common.
- Patients will attempt to support and stabilize their upper body with their hands. This bracing with the hands occurs during walking and sitting, and is the hallmark sign of active QL trigger points.
- Coughing and sneezing can be creating episodes of agonizing pain as the muscle contracts to stabilize the rib cage.
- Patients may be forced to crawl on their hands and knees to the bathroom when getting out of bed in the morning.
- Patients will be unable to roll to either side when laying in a face-up position.
- The pain from untreated QL trigger points may progress to involve the groin, genitalia, and sciatica symptoms.
- The low back pain from QL trigger points may also transform into severe hip pain over time that resembles trochanteric bursitis.
- A common postural distortion with QL trigger points is an elevated hip crest on the painful side [7].

Muscle Energy Technique (MET) are a class of tissue manipulation method that incorporate precisely directed and controlled patient initiated, isometric and/or isotonic contraction designed to improve musculoskeletal function and reduce pain. MET can be used to lengthen and strengthen muscles, to increase fluid mechanics and decrease local oedema, and to mobilize a restricted articulation [8]. Literature (Muscle energy technique for non-specific low-back pain) has shown the support of MET for acute low back pain for improving functional ability when used with supervised neuromuscular re-education and resistance exercise training [9].

Positional release therapy (PRT) is, whereby dysfunctional joints and their muscle are moved away from their restrictive barrier into position of ease in the treatment of both musculoskeletal and visceral dysfunctions [10].

The application of positional release therapy for somatic dysfunction requires a practitioner to first palpate a tender point in the soft tissues. The patient's limb is then moved in such a way that the pain associated with pressure on the tender points is reduced by at least 70 percent to find position of ease [11]. Positional release therapy is useful for treating quadratus lumborum trigger point.

Reported that the minimum period which required holding a position of ease is 90 seconds and suggested that the shortening or "folding-over" of aberrant tissue in positional release achieves its therapeutic modifications via both proprioceptive and nociceptive mechanisms [12].

Both are effective technique to treat mechanical low back pain. There are no evidences on which technique has better effect on quadratus lumborum. Thus, current study is focuses on finding out which technique is better to reduce sub-acute mechanical low back pain.

Methodology

i) Purpose

The intention of the study was to compare the effectiveness of muscle energy technique and positional release technique on quadratus lumborum in sub-acute mechanical low back pain.

ii) Selection of Subjects

To achieve this purpose of the study 60 patients diagnosed with sub-acute mechanical low back pain including both male and female between 18 – 45 years of age with quadratus lumborum trigger points were selected.

iii) Procedure

Subjects were randomly divided into 2 groups; Group A had received muscle energy technique for quadratus lumborum and Group B had received positional release therapy for quadratus lumborum. Conventional treatment was given to both the groups

Palpation assessment for quadratus lumborum over activity

The patient is side-lying and is asked to take the upper arm over the head to grasp the top edge of the table, 'opening out' the lumbar area. The practitioner stands facing the back of the patient and has easy access for palpation of quadratus lumborum lateral border– a major trigger point site (Travell & Simons 1992) – with the cephalad hand. Activity of quadratus is tested (palpated for) with the cephalad hand as the leg is abducted, while also palpating gluteus medius with the caudad hand. If the muscles act simultaneously, or if quadratus fires first, then it is stressed [13].

Group A (Muscle energy technique for quadratus lumborum)

Position of patient-The patient lies supine with the feet crossed (the side to be treated crossed under the non-treated side leg) at the ankle. The patient is arranged in a light side bend, away from the side to be treated, so that the pelvis is towards that side, and the feet and head away from that side ('banana shaped'). As this side bend is being achieved the affected quadratus can be palpated for bind so that the barrier is correctly identified. The patient's heels are placed just off the side of the table, anchoring the lower extremities and pelvis. The patient places the arm of the side to be treated behind her neck.

Position of therapist-standing on the side opposite that to be treated, slides his cephalad hand under the patient's shoulders to grasp the treated side axilla. The patient grasps the practitioner's cephalad arm at the elbow, with the treated side hand, making the contact more secure.

Technique- The patient's treated side elbow should, at this stage, be pointing superiorly. The practitioner's caudal hand is placed firmly but carefully on the anterior superior iliac spine, on the side to be treated. The patient is instructed to very lightly side bend towards the treated side. This should produce an isometric contraction in quadratus lumborum on the side to be treated. After 7 seconds the patient is asked to relax completely, and then to side bend towards the non-treated side, as the practitioner simultaneously transfers his

bodyweight from the cephalad leg to the caudal leg and leans backwards slightly, in order to side bend the patient. This effectively stretches quadratus lumborum. The stretch is held for 15–20 seconds, allowing a lengthening of shortened musculature in the region.
Repeat as necessary [13].

Group B (Positional release therapy for quadratus lumborum)
Position of patient: The patient is prone with the trunk laterally flexed toward the tender point side.
Position of therapist: The therapist stands on the side of the tender point. The therapist places his or her knee on the table and rests the patient's affected leg on the therapist's thigh.
Technique: The tender points are located on the lateral aspect of the transverse processes from L1 to L5. Pressure is applied anteriorly and then medially. The patient's hip is extended and abducted and slight rotation is used to fine-tune [14].

Conventional treatment for low back pain

- Hot pack for 10 minutes to low back.
- static abdominals (10 repetitions -10 seconds hold each)
- static back extensors (10 repetitions -10seconds hold each)
- static glutei (10 repetitions -10seconds hold each)
- pelvic bridging (10 repetitions- 5seconds hold each)
- pelvic rolling (5 repetitions each side- 5seconds hold each)
- Cat-Camel (5 repetitions each - 5seconds hold each)
- Superman (5 repetitions each side-5seconds hold each) [15].

Duration of treatment- 20 minutes.

Findings
Pre and post analysis were done within group using paired t test which showed significant result.

Table 1: Shows the effectiveness of muscle energy technique (GROUP A) on VAS, Modified schober's test and finger to floor test

	Mean±SD	t Value	p Value	Significance
VAS PRE	7.7±1.120	23.79	<0.0001	Extremely significant
VAS Post	3.5±1.098			
MSTF PRE	17.7±0.890	13.81	<0.0001	Extremely significant
MSTF Post	18.9±0.824			
MSTE PRE	12.9±0.767	21.00	<0.0001	Extremely significant
MSTE Post	11.9±0.742			
FTFRF PRE	51.4±3.099	8.11	<0.0001	Extremely significant
FTFRF Post	47.3±1.705			
FTFLF PRE	51.1±3.750	6.24	<0.0001	Extremely significant
FTFLF Post	47.5±1.266			

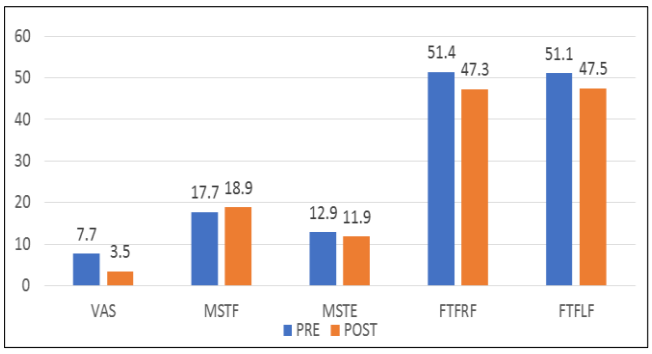

Fig 1

Table 2: Shows the effectiveness of positional release therapy (Group B) on VAS, Modified Schober's test and finger to floor test.

	Mean±SD	t Value	p Value	Significance
VAS PRE	7.3±1.320	30.38	<0.0001	Extremely significant
VAS Post	2.0±0.588			
MSTF PRE	18.0±0.963	14.85	<0.0001	Extremely significant
MSTF Post	19.5±0.709			
MSTE PRE	13.0±0.732	11.73	<0.0001	Extremely significant
MSTE Post	11.3±0.454			
FTFRF PRE	51.6±3.000	11.03	<0.0001	Extremely significant
FTFRF Post	46.3±1.114			
FTFLF PRE	50.8±3.628	8.60	<0.0001	Extremely significant
FTFLF Post	45.9±1.014			

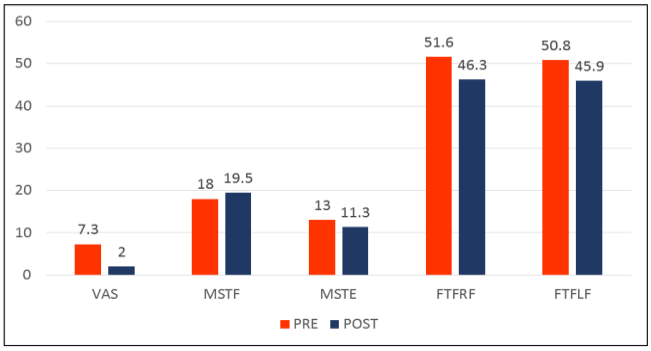

Fig 2

Post analysis of comparison was done using unpaired t- test and the results showed that group B was more effective than group A in reducing sub-acute mechanical low back pain.

Table 3: showing comparison between muscle energy technique and positional release therapy across Vas, modified schober's test and finger to floor test.

	Mean±SD	t Value	p Value	Significance
VAS A	3.5±1.098	6.45	<0.0001	Extremely significant
VAS B	2.0±0.588			
MSTF A	18.9±0.824	2.78	0.0072	Very significant
MSTF B	19.5±0.709			
MSTE A	11.9±0.742	3.31	0.0016	Very significant
MSTE B	11.3±0.454			
FTFRF A	47.3±1.705	2.81	0.0067	Very Significant
FTFRF B	46.3±1.114			
FTFLF A	47.5±1.266	5.23	<0.0001	Extremely significant
FTFLF B	45.9±1.014			

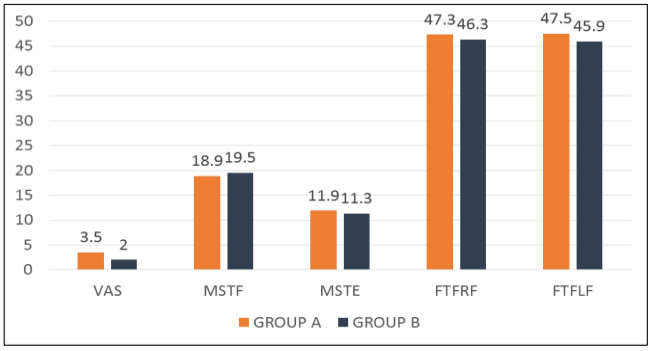

Fig 3

Results
Post data analysis shows that, along with conventional therapy; GROUP B (positional release therapy) has shown significant improvement in reducing sub-acute mechanical

low back pain on visual analogue scale (VAS), modified Schober test (MST) and finger to floor test (FTFT) as compared with GROUP A (muscle energy technique).

Discussion

The present study was done to see the effectiveness of muscle energy technique and positional release therapy for quadratus lumborum in sub-acute mechanical low back pain assessed by using visual analogue scale, modified Schober's test and finger to floor test.

For the study 60 subjects were divided into 2 groups of 30 each. Group A received muscle energy technique and group B received positional release therapy. Conventional treatment was given to both the groups. Other types of systemic conditions, Fracture of vertebra, Lumbar PIVD, operated cases of spine/ spine surgery, Radiculopathies was excluded.

Study was done in hospital in and around Pune for 2 weeks. Data was collected pre and post treatment. Pain was measured using visual analogue scale and range by using modified Schober's test and finger to floor test.

Later the data was statistically analysed using paired t-test for outcome within the groups and unpaired t-test for outcomes between the 2 groups.

The results from statistical analysis supports the alternate hypothesis which states that positional release therapy is effective than muscle energy technique to reduce sub-acute mechanical low back pain.

The present study result demonstrates that subjects with sub-acute mechanical low back pain receiving positional release therapy along with conventional treatment experienced greater improvement in reduction of pain and increase in lumbar range when compared with subjects receiving muscle energy technique along with conventional treatment group.

The analgesic effect of SCS technique could be attributed to bailey and dick (1992) who proposed a nociceptive hypothesis that tissue damage in dysfunctional muscle can be reduced by the positional release mechanism utilized by SCS [16].

Positional release therapy has helped to reduce pain. In this technique the muscles are placed in greatest comfort position. The resulting tissue relaxation improves vascular circulation and removes chemical mediators of inflammation and thus reduces pain [17].

The effectiveness of positional release therapy can be explained by the proprioceptive theory which states that positional release therapy corrects the aberrant neuromuscular activity mediated by muscle spindles & local circulation or the inflammatory reactions mediated by the sympathetic nervous system. According to the proprioceptive theory, the neuromuscular imbalance, which is created by continuous stimulation of the muscle spindles, can be reduced by passively shortening the dysfunctional agonist muscle. Positional release therapy also allows the normal muscle spindle activity to return. Once agonist muscle spindle activity is reset, antagonist muscle spindle activity can also return to the resting state relieving aberrant neuromuscular activity & restoring normal function [18].

The result of current study is supported by Sakina Vohra *et al*l (2014), who proved reduction in low back pain due to quadratus lumborum trigger point, which confirm the assumption that the application of positional release therapy is effective in relieving pain due to quadratus lumborum trigger point thus improving the functional capacity and can be used in physiotherapy management of low back pain [18].

The result of current study is supported by pinakin godse *et al*l (2012), proved reduction in pain and improvement in neck function after application of strain counterstrain technique. And suggests that strain counterstrain technique is useful In reliving the pain and improving functional abilities in patients with active myofascial trigger points in upper trapezius [19].

According to Chaitow (1996), the following are classified as muscle energy techniques: reciprocal inhibition, post-isometric relaxation and joint mobilization [13].

The reduction in pain due to MET can be explained on the basis of its neurophysiology, as described by Chaitow that Post-isometric relaxation (PIR) refers to: the subsequent reduction in tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors called Golgi tendon organ that are located in the tendon of the agonist muscle. These receptors react to overstretching of the muscle by inhibiting further muscle contraction. In more technical terms, a strong muscle contraction against equal counterforce triggers the Golgi tendon organ. The afferent nerve impulse from the Golgi tendon organ enters the dorsal root of the spinal cord and meets with an inhibitory motor neuron. Lewit confirmed this observation that the increased tension of the affected muscles and the resulting pain and dysfunction are both relieved by restoring the full stretch length of the muscle [15].

Lewit (1999) suggest, as do many others, that trigger point and fibrosistic changes in muscle will often disappear after MET contraction methods. He further suggests that referred local pain points, resulting from problem elsewhere, will also disappear more effectively then where local anaesthesia or needling (acupuncture) methods are employed [13].

The result of current study is supported by Keshnee Pillay (2005), in this study stated that a group of subjects with limited range of motion treated with MET would demonstrate a statistically significant increase in lumbar range of motion and a decrease in pain [4].

The result of current study is supported by Priyanka dhargalkar *et al* (2017), who proved that MET has got added beneficial effect for decreasing disability and improving function in patients with chronic nonspecific low back pain [15].

Noelle M.Selkow *et al* did a pilot study on Short-Term Effect of Muscle Energy Technique on Pain in Individuals with Non-Specific Lumbopelvic Pain which showed that subjects receiving MET demonstrated a decrease in VAS worst pain over the past 24 hours, thereby suggesting that MET may be useful to decrease Lumbopelvic pain over 24 hours[20].

Conclusion

Positional release therapy along with conventional treatment on quadratus lumborum appeared to be more effective then muscle energy technique to reduce sub-acute mechanical low back pain.

References

1. Koes BW, van Tulder MW, Thomas S. Diagnosis and treatment of low back pain. BMJ. 2006; 332(7555):1430-1434.
2. Balagué F, Mannion AF, Pellisé F, Cedraschi C, Nonspecific low back pain. Lancet. 2012 4(379):482-91.
3. Lizier DT, Perez MV, Sakata RK, Exercises and treatment of nonspecific low back pain. 2012; 62(6):838-46. The Quadratus Lumborum Muscle: Cause of Back Pain.

4. Pille K. Relative effectiveness of MET as appose to specific passive mobilization in the treatment if acute and sub-acute mechanical ow back pain, 2005.
5. Amee L. Quadratus Lumborum Muscle: Cause of Back Pain, 2017.
6. Prodyut Das. (PT), Quadratus Lumborum Stretch, 2009.
7. Dr. Laura Perry. The Quadratus Lumborum Trigger Points: Masters of Low Back Pain, 2011.
8. Chaitow Leon, Muscle Energy Technique, Third edition, Churchill livingstone, 2006.
9. Franke H, Fryer G, *et al*. Muscle energy technique (MET) for non-specific low-back pain. Cochrane, 2015.
10. Weiselfish Giammatteo S. Integrative Manual Therapy for the Autonomic Nervous System and Related Disorders: Utilizing Advanced Strain and Counter Strain Technique; Vol. One. Berkeley, California, USA: North Atlantic Books, 1997.
11. Wong CK, Schauer-Alvarez C. Effect of strain counterstrain on pain and strength in hip musculature. J Man Manipulative Ther. 2004; 12(4):215- 223.
12. Bailey M, and Dick L. Nociceptive considerations in treating with counterstrain. J Am, Osteopath Assoc. 1992; 92(3):334-341.
13. Leon Chaitow. Advanced Soft Tissue Techniques. Second Edition.
14. Kerry JD, Ambrogio B, George PT, Roth B. Positional Release Therapy. Assessment and Treatment of Musculoskeletal Dysfunction.
15. Priyanka Dhargalkar, Anjali Kulkarni, Snehal Ghodey, added effect of muscle energt technique for improving functional ability in patients with chronic nonspecific low back pain, 2017.
16. Baily M, Dick L. Nociceptive consideration in treating with counter stran. J. Am. Osteopathic Association. 1992; 92(3):334-341.
17. Saavedra FJ, Cordeiro MT, Alves JV, Fernandes HM, Reis VM, Mont Alverne DG. The influence pf positional release therapy on the myofascial tension of the upper trapezius muscle. Revista Brasileira de cineantropometria and desempenho humano. 2014; 16(2):19-19.
18. Sakina Vohra, BPTh; Varoon Jaiswal C, *et al*. effectiveness of strain counterstrain technique on quadratus lumborum trigger point in low back pain, 2014.
19. Pinakin Godse, Seema Sharma, Tushar Palekar J. Effect of strain-counterstrain technique on upper trapezius trigger points, 2012.
20. Noelle Selkow M, Terry Grindstaff L, *et al*. Short- Term Effect of Muscle Energy Technique on Pain in individuals with Non-Specific Lumbopelvic Pain: A Pilot Study. J Man Manip Ther. 2009; 17(1):E14-E18.