The effect of muscle energy technique on Piriformis and Trunk oblique muscles in maintaining symmetrical posture in sitting posture

Geetha Loganathan

S1909018

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National University of Medical Sciences – Spain

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Introduction:

Muscle Energy technique (MET) is a broad class of manual therapy techniques directed at improving musculo-skeletal function or joint function, and improving pain, METs are commonly used by manual therapists, physical therapists, chiropractors, atheletic trainers, osteopathic physicians, and massage therapists.

It requires the patient to actively use his or her muscles on request to aid in treatment. MET are used to treat somatic dysfunction, especially decreased range of motion, muscle hypertonicity, and pain.

This technique that was developed in 1948 by Fred Mitchell, Sr, D.O. It is a form of manual therapy, widely used in Osteopathy that uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition and lengthen the muscle.

As compared to static stretching which is a passive technique in which the therapist does all the work, MET is an active technique in which the patient is also an active participant. MET is based on the concepts of Autogenic inhibition and reciprocal inhibition. If a sub maximal contraction of the muscle is followed by stretching of the same muscle it is known as Autogenic Inhibition MET, and if a sub maximal contraction of a muscle is followed by stretching of the opposite muscle then this is known as Reciprocal Inhibition MET.

Pain is a complex, multifaceted perception that varies in strength, quality, duration, location, and unpleasantness. Research has enabled us to recognize that pain is better described as an experience influenced by many factors, and not simply or directly related to the nature and extend of tissue damage (McGrath,1994). An Osteopath understands that pain is subjective and thus treats holistically, tailoring the therapy to the individual's pain presentation. A pain scale is established with the patient upon initial meeting and is re-established after each treatment and with each visit.

The piriformis muscle is a small muscle located deep in the buttock (behind the gluteus maximus). It belongs to a group of six short external rotators of the hip, i.e. gemellus superior, obturator internus, gemellus inferior, quadrates femoris, obturator externus. Attaching to the sacrum on one end and the greater trochanter on the other one, this muscle is responsible for stabilizing the hip joint and moving the thigh in various directions.

Oblique muscle refers to two abdominal muscles – the external and internal obliques. Its located in the anterolateral abdominal wall. These provide trunk flexion and rotation. The external oblique is the thickest and runs from the lower ribs to the iliac crest. The internal obliques lies under the external muscle and also originates at the iliac crest before reaching the pubic bone. It joins a sheet of connective tissue shared with the transverses abdominis muscle.

Fascial Lateral line, The fascial "trains" was introduced by Thomas myers in his book, Anatomy trains. Lateral fascial train simply refers to the fact that it's on the side of the body(as opposed in the middle).

The lateral line actually starts on the inside bottom of the foot and wraps under the heel, it continues up the outside of the lower leg(these muscles are called fibularis or peroneus longus and brevis). The lateral line crosses the outside of the knee and continues up the iliotibial tract (ITT) (also known as IT band). Near the top of the ITT, the lateral line includes hip abductor muscles (muscles that moves the upper leg away from the center of the body, such as the TFL, gluteus medius, and part of the gluteus maximus). These muscles attach to the greater trochanter of hip bone. From he hip area upward, the lateral line includes the lateral obliques (of the abdominal muscles) and the muscles between the ribs (intercostals). The last portion of the lateral line are the muscles along the side of the neck (SCM and splenius capitus) – which are used to tilt the head to one side.

The tightness in the lateral line can affect the mobility of the body. Tightness in the lateral line can affect ankle mobility, even causing a person to have an altered running stride. This can be seen as the foot comes off the pavemen and is pulled outwards (due to tightness), like "foot whip".

The tightness in ITT (ITB issues) – adhesions or tightness in the IT band is common among runners. The ITB is mainly fascia, so attempts to "rollout IT band" are likely to be unsuccessful.

Trunk – tightness in the lateral line can cause a shift in the rib cage to one side (impacts breathing) or possibly limit the ability to perform side bends (to the opposite side of the tightness). The tightness leading to restricted movements. It cause "wobble" side to side when walking since the lateral line isn't as flexible.

Head / Neck - tightness in this portion of the lateral line can lead to issues with shoulder restriction, head stability or even head forward posture (from excessive seated desk/computer work / phone use).

The MET is a widely accepted method for treating piriformis and obliques. By doing treatment to these muscles will maintain flexibility of the muscles and maintain symmetrical movement of the posture.

Objective:

The purpose of this study was to regain or investigate the effect of muscle energy technique on Piriformis and Trunk oblique muscles in maintaining the symmetrical posture maintaining by increasing the muscle length and flexibility and sustain the optimal muscle length tension relationship of the muscle.

Material and Method:

In this study, the target population is the people who is in IT profession and defined as men between 35 – 45 years old who is in a sedentary lifestyle working in that profession for more than 5 years with the sedentary lifestyle with a hip ipsilateral rotation and lower back contralateral lower trunk movement limitation or restriction.

To determine the sample size, using the relevant formula and previous studies, the researcher selected 30 people from the 100 men who had the entry and exit criteria specified in the plan.

Including criteria:

The people who have stiffness at the hip and lower back, People who had restriction at the hip and lower back movement especially trunk forward bending, side bending and same side rotation. The people who can’t do cross leg sitting on the floor or over the table and one knee or thigh lifted more off than the other side of the thigh and knee.

Excluding criteria:

Any history of fall, trauma, road traffic accident, fracture at the pelvic, back and lower extremity, any surgeries at the hip, pelvis, lower back and at any spinal level, or back pain in the past year, having any form of exercises before the test.

Following test or evaluation tools to get the data for pre and post results.

a. Cross leg sitting:

This simple test is to determine flexibility of the lumbo – pelvic area and to measure the length of the piriformis and gluteal external rotators.

Ask the volunteer to sit on the floor or bed with both legs is crossed over one another and remain relaxed sitting without moving the body. This test is to measure the distance between the lateral patella lateral point to the floor for both the side. The same test will be performed after the application of MET over the above mentioned muscles.

b. FAIR test:

To determine the shortness of the length of the piriformis muscle by the volunteer is positioned in side – lying on the unaffected side. The symptomatic leg is positioned in 60 – 90 degrees of flexion in the hip and 90 degrees flexion in the knee joint.

The volunteer should be lying with the face directed towards the examiner, the examiner's hand is placed on the pelvis to stabilize it, and the other hand is placed on the lateral side of the knee.

The examiner gives hand pressure on the lateral side of the knee and tries to stretch the part as far as possible. The examiner performs horizontal adduction while putting pressure on the knees in the direction of the table. During the stretch, the patient may feel discomfort or pain and the examiner will observe the flexibility of the muscle and measure the distance between knee and the couch. The same test will be performed after the application of MET over the above mentioned muscles.

c. Pendulum test:

i. Seated Pendulum test in cross leg sitting:

This test is to determine the lateral curvature of the spine by handing the pendulum vertically down behind the back of the volunteer spine and measuring the distance from the pendulum string and to the lateral corner of the trunk or love handle at both side of the lumbar area. This is to evaluate the postural scoliosis at the lumbar spine and the difference between the right and left side. This will determine the longest side is for performing METs.

ii. Seated side bending and rotation:

This is to evaluate the range of motion of lumbar lateral bending and rotation for the lumbar spine by ipsilateral bending and ipsilateral trunk rotation to get the oblique group performance, flexibility, muscle length and range of motion.

Ask the volunteer to sit cross legged or sit erect. Ask them to cross the both hand in front of chest like covering the chest. Then ask them bend the trunk towards one side fully with an available full range and rotated to the same side fully without any trick movement or using any other body part. Then, the examiner measure the distance between the floor and same side olecronon process of elbow (prominal point). This is to evaluate the range of motion at the lumbar spine and the difference between the right and left side. This will determine the decreased ROM side is for performing METs.

Research Methodology:

Application of METS on Piriformis and trunk Oblique muscles:

i. Muscle energy technique on piriformis:

Lay the volunteer in the supine position and have the practitioner stand on the same side as the affected piriformis muscle. Bend the knee of the affected side and place the foot of that side on the lateral aspect of the opposite knee.

Have the practitioner push knee medially until meeting the restrictive barrier. Have the volunteer push against the practioner's resistance for 3 – 5 seconds,

allow for a period of isometric relaxation, and then engage a new barrier: repeat three times. Return the volunteer to a neutral position and reassess using supine or prone piriformis testing. It performed for 5 times. It's a onetime method.

ii. Muscle energy technique on trunk obliques:

Have the volunteer in sitting position on the table and make him to cross or cover the chest with both arms. The practitioner is standing on the same side as the affected oblique muscle. Ask the volunteer to bend the trunk ipsilateral side bending and rotating to the ipsillateral side to the limited range available at the lumbar side.

Have the practitioner push the ipsilateral trunk sideways (side bending) and rotating to the ipsilateral side (opposite side rotation) until meeting the restrictive barrier. Have the volunteer push against the practioner's resistance for 3 – 5 seconds, allow for a period of isometric relaxation, and then engage a new barrier: repeat three times. Return the volunteer to a neutral position and reassess using muscle length and range of motion testing. It performed for 5 times. It's a onetime method.

Main outcome measures:

After providing METS to the above muscle group showed visible difference of the flexibility and to the alignment of the spine and increased range of cross leg sitting.

a. Cross leg sitting:

After, the application of METS to the piriformis and oblique muscles reduced the distance between the thigh and bed/ floor compared to the previous range. It proves Muscle Energy Technique improves muscle length and flexibility of the piriformis and oblique group and also it relaxes the fascia. The volunteer was mentioning they were feeling more relaxed and able to sit comfortably on the floor and able to sit erect compared to before.

b. Seated Pendulum test in cross leg sitting:

After, the application of METS to the piriformis and oblique muscles reduced the distance between the pendulum and corner of trunk compared to the previous range. Muscle Energy Technique improves muscle length and flexibility of the piriformis and oblique group and also it relaxes thethoraco lumbar and pelvic fascia. The volunteer was mentioning they were feeling more relaxed and able to sit comfortably on the floor and able to sit erect compared to before.

c. Seated side bending and rotation:

After, the application of METS to the piriformis and oblique muscles reduced the distance between the bent elbow in front of the chest and bed/ floor compared to the previous range. Muscle Energy Technique improves muscle length and flexibility of the piriformis and oblique group and also it relaxes the fascia. The volunteer was mentioning they were feeling more relaxed and able to sit comfortably on the floor and able to sit erect compared to before.

Results:

The data has recorded before and after the evaluation made for the muscle length, flexibility and range of motion. After confirming the difference of date between the pre and post data obtained by above 3 tests showed there is a significant change in the muscle range of motion and alignment after application of MET over the piriformis and oblique muscles.

The result of this study showed that the application of a session of muscle energy therapy(MET) has been able to significantly improve the range of motion of the pelvis and trunk compared to before treatment and be effective in maintain the symmetrical alignment of body.

Muscle Energy Technique improves muscle length and flexibility of the piriformis and oblique group and also it relaxes the thoracolumbar and pelvic fascia. The volunteer was mentioning they were feeling more relaxed and able to sit comfortably on the floor and able to sit erect compared to before posture.

Conclusion:

This study found that muscle energy technique has been shown to be an effective technique in increasing the flexibility of piriformis and oblique muscle (internal and external obliques) and single application of MET produced an increase in angle and range of motion of the joint of the hip an reduced the spinal curvature and trunk rotation.

This suggested that a single application of MET didn't produce any pain but created a change in the tolerance to stretch as there was no evidence of viscoelastic change.

It proves Muscle Energy Technique improves muscle length and flexibility of the piriformis and oblique group and also it relaxes the thoaco lumbar and pelvic fascia. The volunteer was mentioning they were feeling more relaxed and able to sit comfortably on the floor and able to sit erect compared to before posture. So Muscle Energy Technique can be used as one of the effective treatment technique to maintain or realign the symmetrical posture of spine and pelvis.