Effect of Muscle Energy Technique on Pain Perception and Functional Disability of Women with Postnatal Low Back Pain

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Authors’ contributions

This work was carried out in collaboration between all authors. Author AME designed the study, wrote the protocol and managed the analyses of the study. Author MAM performed the statistical analysis, wrote the first draft of the manuscript and managed the analyses of the study. Author AMM managed the literature searches. All authors read and approved the final manuscript.

ABSTRACT

Aims: To determine the effect of muscle energy technique (MET) on postnatal low back pain.

Place and Duration of Study: Department of obstetrics and gynecology, Ain Shams University Hospital, and Outpatient Clinic of Faculty of Physical Therapy, Cairo University, between January and May 2013.

Methodology: This study was carried out upon forty women diagnosed as postnatal low back pain. They were selected from outpatient clinics of gynecology of Ain Shams University Hospital, Cairo University. Their age ranged from 25-35 years, BMI<30kg/ m², they were all after normal vaginal delivery using local anaesthesia. Patients with radicular pain distal to the knee, previous low back surgery, low back pathology diagnosed by a physician, spondylololisthesis and chronic low back pain were excluded from the study. They were randomly assigned into two equal groups (A& B). Group (A) consisted of twenty subjects, with an average age 29.2±1.9Yrs, and BMI 27.28±2.1kg/m² who received MET. Group (B) consisted of twenty patients, with an average age 28.58±2.2Yrs, and BMI 28.92±0.7kg/m² who received sham technique. A hot pack was used for 15 minutes for both groups (A&B) before the treatment. This is to decrease...
pain, muscle spasm, and provide vasodilatation of the blood vessels supplying the area. The MET was applied three times per week for four weeks for patients in group A, and the sham technique was applied three times per week for four weeks for subjects of group (B). Assessment of all subjects in both groups (A&B) was carried out before and after the treatment program using Visual Analogue Scale (VAS) and Stratford Back Pain Functional Scale (BPFS).

**Results:** There was a statistically highly significant decrease (P<0.001) in VAS scores and a statistically highly significant increase (P<0.001) in BPFS, after 4 weeks of the treatment program for group A than group B.

**Conclusion:** Muscle energy technique is an effective and safe method in alleviating postnatal low back pain.

Keywords: Muscle energy technique; low back pain; postnatal period.

1. **INTRODUCTION**

Low back pain is very common, and affects 70–85% of adults at least once during their lifetime [1]. Low back pain can be very severe causing sharp shooting pain or it can be a mild pain such as a dull ache. In most cases a person can recover without needing to seek medical attention, recovering within a couple of days up to 6 weeks [2,3].

Back pain is considered a normal consequence of pregnancy caused by mechanical and hormonal changes and is expected to disappear after puerperium [4]. The majority of women recover from pregnancy-related low back pain within 3 months of delivery [5]. However, postpartum follow-up studies have shown that between 8–20% of women still have persistent non-specific low back pains 2–3 years after delivery that interferes with daily activities [6,7].

Women who still complain from pain at 3 months are considered at risk for persistent pain [5]. The evaluation of lumbopelvic pain postpartum is mostly based on self-administered questionnaires or interviews, and the lumbopelvic pain is occasionally assessed by clinical evaluation [6,8].

In addition, postpartum follow-ups seldom include the entire initial pregnant cohort [8], which may be important since the debut of lumbopelvic pain may present even in relation to delivery [9].

In the past it was widely believed that bed rest was the best cure for acute low back pain. Trends are now moving away from that old way of thinking and exercise is now being prescribed for treatment [10].

Osteopaths and other Manipulative Therapists developed Muscle Energy Technique (MET) beginning with Fred Mitchell, in the 1950s, which started with the pelvis. They are a gentle but highly effective treatment of musculoskeletal dysfunction. MET uses isometric or isotonic contractions as a way of lengthening tight muscle; strengthening weak muscle; mobilizing joints and relieving congestion in the tissues. Good quality results require skilled application and an accurate diagnosis of muscle condition [11].
Muscle energy technique (MET) aims to normalize soft tissue structures, such as shortened or tight muscles with no direct implication to the joint associated with these soft tissues. MET can be used to improve joint mobility by influencing soft tissues dysfunction through relaxing tight tense musculature, spasms, or fibrotic changes [12,13].

Muscle energy technique (MET) has been defined when the patient uses her force against the therapist’s counterforce. The therapist brings the area of treatment to a pain free end range barrier by taking up the slack of the available soft tissue. Once the patient is brought to the pain free end range barrier the therapist will request the patient to use his/her muscles to resist or push back against the therapist [12].

Muscle energy technique (MET) is a common conservative treatment for pathology around the spine, particularly lumbopelvic pain (LPP). MET is considered a gentle manual therapy for restricted motion of the spine and extremities and is an active technique where the patient, not the clinician, controls the corrective force. This treatment requires the patient to perform voluntary muscle contractions of varying intensity, in a precise direction, while the clinician applies a counterforce not allowing movement to occur. For many years, MET has been advocated to treat muscle imbalances of the lumbopelvic region such as pelvis asymmetry. The theory behind MET suggests that the technique is used to correct an asymmetry by targeting a contraction of the hamstring or the hip flexors on the painful side of the low back and moving the innominate in a corrected direction. It is worth noting however, that evidence suggests that non-symptomatic individuals have also been shown to have pelvis asymmetries. Despite this, MET is frequently used by manual therapy clinicians [14,15].

Muscle energy technique (MET) is an effective conservative modality to alleviate lumbopelvic pain. The touch of the clinician, along with stimulation of agonist and antagonist muscles, seems to decrease perception of pain. This technique could be applied prior to other rehab techniques, such as strengthening exercises, to decrease pain and enhance the effect of applied exercise program. There are many advantages for applying MET, that it takes a very short time to be applied (less than 1 minute). It also allows the clinician to have physical contact with the patient. Lastly, MET is a low-force isometric contraction in a pain-free position. Finally, this technique is not painful or harmful to the patient [16].

Unfortunately, few studies have examined the effectiveness of MET. Previous research has found that MET combined with other conservative modalities such as, massage and resistance exercises may be effective for decreasing disability and improving function in patients with acute low back pain, but the effect of MET as an isolated treatment has not been determined [15].

Therefore, the aim of this study was to investigate the effect of MET on post –n at allow back pain.

2. MATERIALS AND METHODS

A randomised controlled trial design was used for the purposes of the current study. Patients were randomised to either group A (MET group) or B (sham technique group) by simple randomization using the envelope method. Accordingly, a pack of sealed envelopes including a card with either the word ‘MET’ or ‘Sham technique’ written on it, was given to a staff physical therapist unrelated to the study; she picked one envelope after patients agreed...
to take part in the study. Depending on which card was selected patients were allocated to their respective group.

This study was carried out upon forty women diagnosed as postnatal low back pain. They were selected from Outpatient Clinics of Gynecology of Ain Shams University Hospital. Their age ranged from (25-35) years and BMI<30kg/m², they were all after normal vaginal delivery using local anaesthesia.

Group (A) consisted of twenty subjects, with an average age (29.2±1.9Yrs), and BMI (27.28±2.1kg/m²) who received MET. Group (B) consisted of twenty subjects, with an average age (28.58±2.2Yrs), and BMI (28.92±0.7kg/m²) who received sham technique.

Exclusion criteria included low back pain lasting longer than 6 weeks, radicular pain distal to the knee, previous low back surgery, low back pathology diagnosed by a physician, spondylolisthesis and chronic low back pain.

A hot pack was used for 15 minutes in a prone position for both groups (A&B) before the treatment. Hot packs were used to heat small areas, and allow for decrease pain, muscle spasm, and provide vasodilatation of the blood vessels supplying the area.

The MET was performed in supine with the subject’s buttocks just off the edge of the Plinth. The leg on the side of the anterior innominate was placed on the therapist’s shoulder, and the subject was asked to push the leg into the therapist’s shoulder and push up with the opposite leg. Four contractions were performed with a 5-s hold and 5-s rest between contractions. Muscle energy technique (MET) was applied three times per week for four weeks for patients in group A. The sham was gentle pressure on the anterosuperior iliac spine with the patient in supine for 30 s.

2.1 Statistical Analysis

The Data were analyzed using SPSS statistical package and presented using descriptive statistics including the mean, percent and the standard deviation in addition to dependent samples t-test was used for the comparison between the variables. A p-value of less than 0.05 (p<0.05) was considered as statistically significant as shown in Table 1.

| Table 1. Physical characteristics of patients in both groups (A&B) |
|---------------------------------|-----------------|-----------------|
|                                | Group (A)       | Group (B)       |
| Age                            | 29.2±1.9        | 28.58±2.2       |
| BMI                            | 27.28±2.1       | 28.92±0.7       |

2.2 Regarding to Visual Analogue Scale

In group A the mean value before treatment was 2.65±0.81, while after the treatment program the mean value was (1.30±0.92). The statistical difference between results before and after the treatment program showed (P<0.001). The statistical difference between the results before and after the treatment program was П<0.001, indicating a statistically high significant decrease by 50.94% as shown in Table 2.
In group B, the mean value before treatment was 2.40±0.94, while after treatment program the mean value was 2.20±0.77. The statistical difference between the results before and after the treatment program showed non statistical significant (P>0.05) decrease by 8.33%, as shown in Table 3.

Table 2. The mean values of visual analogue scale before and after treatment for group A

|                | Mean  | S.D   | t-test | P value | Percentage of change |
|----------------|-------|-------|--------|---------|----------------------|
| Pre training   | 2.65  | ± 0.81| 9.0    | <0.001  | 50.94                |
| Post training  | 1.30  | ±0.92 |        |         |                      |

Table 3. The mean values of visual analogue scale before and after treatment for group B

|                | Mean  | S.D   | t-test | P value | Percentage of change |
|----------------|-------|-------|--------|---------|----------------------|
| Pre training   | 2.40  | ± 0.94| 1.07   | > 0.05  | 8.33                 |
| Post training  | 2.20  | ±0.77 |        |         |                      |

On comparing both groups after treatment the results show highly significant difference as the t-value was 3.35 and the percentage of change was 69.23%, as shown in Table 4.

Table 4. The mean values of visual analogue scale after treatment for both groups

|                | Mean  | S.D   | t-test | P value | Percentage of change |
|----------------|-------|-------|--------|---------|----------------------|
| Group A        | 1.30  | ± 0.92| 3.35   | <0.001  | 69.23                |
| Group B        | 2.20  | ±0.77 |        |         |                      |

2.3 Regarding to Stratford Functional Scale

In group A the mean value before treatment was 27.70±4.67, while after the treatment program the mean value was 41.70±7.17.

The statistical difference between results before and after the treatment program showed a statistically high significant (P<0.001) increase by 50.54%, as shown in Table 5.

Group B showed on statistically significant results as shown in the Table 6.

Table 5. The mean values of Stratford functional scale before and after treatment for group A

|                | Mean  | S.D   | t-test | P value | Percentage of change |
|----------------|-------|-------|--------|---------|----------------------|
| Pre training   | 27.70 | ± 4.67| 11.99  | <0.001  | 50.54                |
| Post training  | 41.70 | ±7.17 |        |         |                      |

Table 6. The mean values of Stratford functional scale before and after treatment for group B

|                | Mean  | S.D   | t-test | P value | Percentage of change |
|----------------|-------|-------|--------|---------|----------------------|
| Pre training   | 28.55 | 4.83  | 0.29   | > 0.05  | 0.35                 |
| Post training  | 28.45 | 4.76  |        |         |                      |
On comparing both groups before and after treatment program, the results showed highly statistically significant results as with a highly statistically significant difference between group A and group B (P<0.001), as shown in Table 7.

Table 7. The mean values of Stratford functional scale after treatment for both groups

| Percentage of change | Group A | Group B |
|----------------------|---------|---------|
|                      | Mean    | S.D     | t-test | t-test | P value | Percentage of change |
| 31.77%               | 41.70   | 28.45   | 6.89   | < 0.001|         | 31.77%               |
| 4.76                 | 7.17    | 4.76    |        |        |         |                     |

3.3 DISCUSSION

A large percentage of the adult population suffers from Low Back Pain (LBP), with a high frequency of recurrent episodes [17].

A variety of manual therapy techniques were used in the management of low back pain to reduce pain, improve function, and reduce disability. In recent years, muscle energy techniques were increasingly used in clinics to treat low back pain. Muscle energy techniques can be employed to reposition a dysfunctional joint and treat the affected musculature, the patient perform a voluntary muscle contraction "in a precisely controlled direction, against a distinctly executed counter force applied by the operator" [18].

Radebold et al. [21] conducted a study to evaluate balance performance in unstable sitting and trunk muscle response to quick force release in 16 patients with chronic low back pain and 14 matched healthy control subjects, revealing that patients with low back pain demonstrated poorer postural control of the lumbar spine and longer trunk muscle response times than normal subjects. Correlation between these two phenomena suggests a common underlying pathology in the lumbar spine [19].

Low back pain characteristically involves the signs of local tenderness, tissue texture change and asymmetrical contraction of muscles. Sustained muscle contraction is often a primary source of lumbopelvic dysfunction and pain [20].

Ballantyne et al. [19] conducted a study on 40 asymptomatic subjects to investigate the effectiveness of muscle energy technique in increasing passive knee extension and to explore the mechanism behind any observed change; a significant increase in range of motion was observed at the knee following a single application of muscle energy technique. So, muscle energy is an effective technique; meaning it engages a restrictive barrier and requires the patient's participation for maximal effect. As the patient performs an isometric contraction, golgi activation results in direct inhibition of agonist muscles, A reflexive reciprocal inhibition occurs at the antagonistic muscles, As the patient relaxes, agonist and antagonist muscles remain inhibited allowing the joint to be moved further into the restricted range of motion patients with disorders such as low back [15,19].

The results of the present study revealed that, there was statistically significant decrease in post natal low back pain and the functional level for group (A), that was treated by MET, this was supported by Wilson et al. [15] who stated that using MET and resistance exercises may benefit a patient greater than using neuromuscular re-education and resistance exercises to reduce low back pain and improve functional level.
Also, the result of this study was confirmed with that of Roland 2012 who stated that muscle energy technique is effective in relieving pain, improving range of motion and reducing disability in subjects with recurrent low back pain [22].

Shiby [23] added that muscle Energy Technique was effective as Manipulation in the treatment of low back pain. The treatment was not harmful, but provided as much benefit.

The physiological mechanisms underlying the therapeutic effects of MET are unclear and may involve a variety of neurological and biomechanical mechanisms, including hypoalgesia, altered proprioception, motor programming and control, and changes in tissue fluid [24].

Lasting biomechanical changes to muscle property following MET have not been demonstrated, and changes to muscle extensibility and spinal range of motion may be related to mechanisms promoting hypoalgesia and an increase in stretch tolerance. Clinical studies suggest MET and related post-isometric techniques reduce pain and discomfort when applied to the spine [15].

MET may have physiological effects, regardless of the presence or absence of dysfunction [25].

MET has several uses that can help increase muscle strength, increase range of motion (ROM), and decrease edema, muscle energy techniques may have a greater impact on outcomes when administered over more than 1 treatment session in conjunction with therapeutic and motor-control exercise [15].

MET combined with supervised motor control and resistance exercises may be more effective for decreasing disability and improving function in patients with acute low back pain [15].

4. CONCLUSION

In conclusion, MET appears to be an alternative effective method to decrease back pain and improve functional level in postnatal period.

CONSENT

All authors declare that ‘written informed consent was obtained from the patient before starting the study for publication of this case report.

ETHICAL APPROVAL

This study was approved by ethical committee of faculty of Physical Therapy, Cairo University.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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