

EFFECT OF MUSCLE ENERGY TECHNEQUE ON POSTPARTUM SACROILIAC JOINT DYSFUNCATION: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Background: Sacroiliac pain is a massive problem in women during pregnancy and postpartum period. Muscle energy technique decreases pain and disability. Objective: to determine the effect of muscle energy technique on postpartum sacroiliac dysfunction. **Methods:** A sample of forty women diagnosed with postpartum sacroiliac dysfunction, their ages were from 20 to 40 years and their body mass index were from 25 to 30 kg/m² participated in this study, they were selected and divided randomly into 2 identical groups (A&B). Group (A) (study group): consisted of 20 patients, they received muscle energy technique for 12 sessions, 3 sessions / week. Group (B) (control group): consisted of 20 patients, they received alternative hot and ice packs for 20 minutes /session (10 minutes for each). All patients in both groups (A&B) were evaluated at the beginning of the study and after 12 sessions through measuring pain intensity using visual analog scale and disability using oswestry disability index (ODI). **Results:** This study shown that there was a statistically significant reduction in the mean value of VAS in group (A) when compared with its corresponding value in group (B) with p value = 0.0001. Also, the results of this study shown that there was a statistically significant reduction in the mean value of ODI in group (A) when compared with its corresponding value in group (B) with p value = 0.0001. **Conclusion:** Muscle energy technique could be utilized as an effective treatment in post-partum females with sacroiliac joint dysfunction to decrease pain and disability.

Keywords: Muscle energy technique, Visual analogue scale, Oswestry disability index.

I-INTRODUCTION

The sacroiliac joint is a common source of pain around the pelvic joints and lower back with pain in thighs [1]. It influences about 15% to 25% of population [2]. Sacroiliac dysfunction is a state of altered mechanics, whichever an increase otherwise declining from the conventional average or the existence of an unusual motion [3].

It was known as a disorder triggering pain to arise from the sacroiliac joint and is produced by the expanded or unusual ilia movement nearby the sacrum and soreness of sacroiliac joint structures (capsule, pain receptors and ligaments situated within the joint) [4].

Regardless of recurrent incidence of sacroiliac joint dysfunction, its evaluation and treatment were deficiently illuminated in announced literature. The medical analysis of sacroiliac joint dysfunction depends on intensive record and somatic inspection. During gestation, pelvic girdle pain (PGP) and symphysis pubis dysfunction (SPD) are a consequence of ligament laxity caused by the raised estrogen and relaxin levels, in addition to the biomechanical postural stresses of last phase of pregnancy. The lax ligaments can be indicative like an immediate consequence of birth when the SI joints and symphysis pubic go through distortion during the last phases of birth [5].

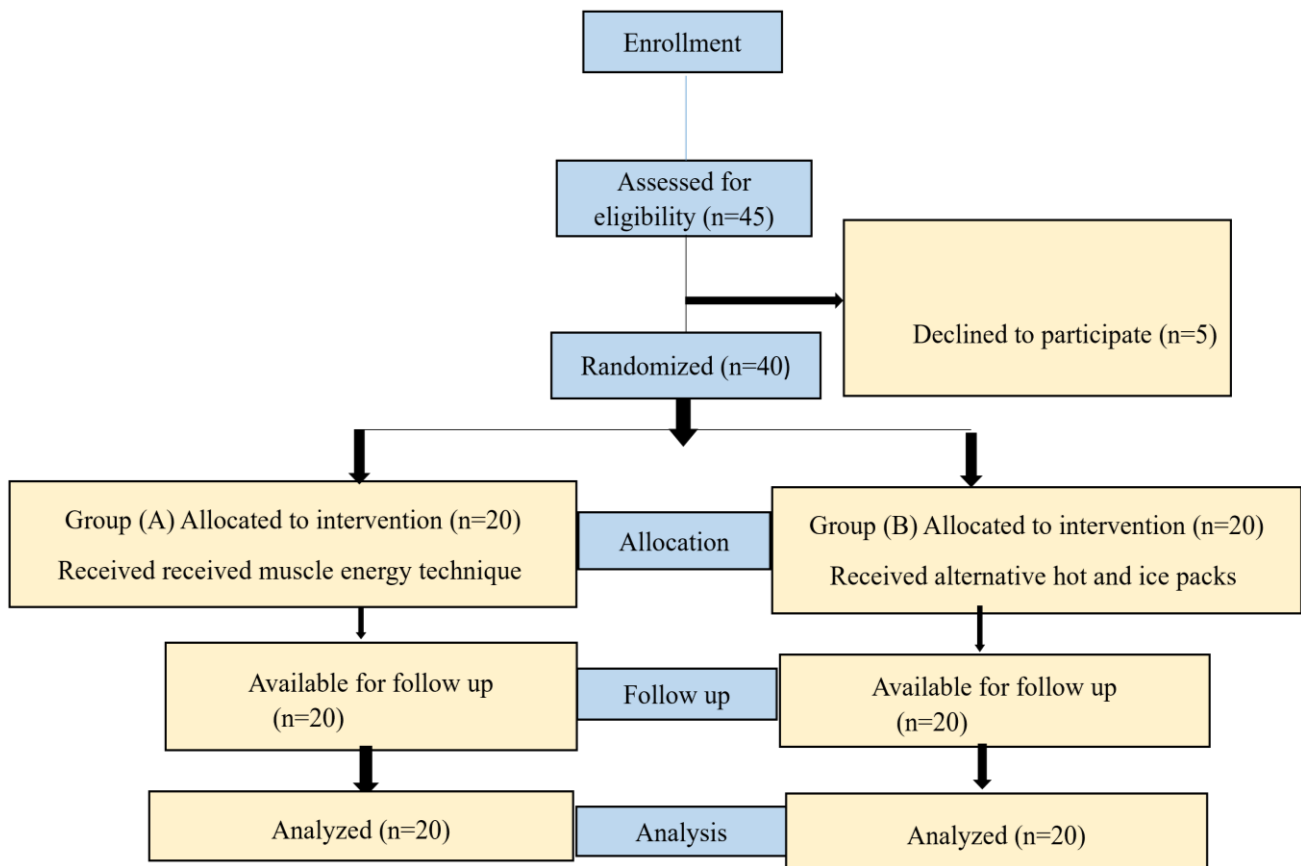


Fig. 1. Consort Flow chart for the participants in the study

• **Methods**

Before beginning the sessions, the purpose of the study and the treatment procedures were illustrated to all participants to attain their confidence and cooperation and informed consent form was signed from all females. This study was conducted at from February 2021 to June 2021.

• **Treatment procedures:**

(1) Muscle energy technique for group (A):

MET was performed in the shape of post-isometric relaxation procedure for iliopsoas, hamstrings, and erector spinae and quadratus lumborum muscles. The constraint barrier (the dot where no additional motion realized) was identified at that time the physiotherapist directed the participants to do a 20-30% of extreme voluntary isometric contraction, subsequently keep on for 7-10 seconds and release for 2- 3 seconds. Proper breathing guidelines were provided. Then on an exhalation, the extremity was moved somewhat more the restriction barrier and then was kept on here for 10–30 seconds, it was performed 3 times per session for 12 sessions.

- ***For iliopsoas muscle:***

The participants were in supine lying position with the buttocks at the border of the plinth, non-affected lower limb completely bent at hip and knee and kept that placement via the participant. The affected extremity was permitted to suspend freely. Physiotherapist’s hand on the frontal inferior portion of the patient’s thigh, another hand set on the frontal superior portion of other leg. Afterward the isometric contraction, the patient’s thigh was moved with a light grade of force more the constraint barrier to the ground during exhalation and for 10–30 seconds.

- ***For hamstrings muscle:***

The participant was in the supine position with his limb suspended above physiotherapist’s shoulder. Physiotherapist’s hand was on the frontal inferior portion of the patient’s thigh of the sound extremity; another hand set on the frontal inferior portion of other thigh beyond knee joint to keep extension on knee joint. The physiotherapist flexed the participant’s hip and extended the knee. The participant performed a slight knee isometric flexion (20-30% of maximal contraction), via compressing his ankle joint in contrast to the upper part of the physiotherapist’s shoulder. Afterward relaxation, the physiotherapist pushed the leg to the new barrier and the position was kept for

30 seconds.

- For erector spinae muscle:

The participant sits on the management plinth, posterior to the physiotherapist. The participant was maintained into flexion, rotation and side bending position. Once the participants attain tolerated flexion, the physiotherapist enquired him to do extension, side bending and rotation to the contradictory side whereas holding the breathing for 7–10 seconds, at that moment the participant was told to exhale. The physiotherapist remained for the patient's full releasing the breath and then got the subject more in whole directions of restraint, in the direction of the new barrier.

- For Quadratus lumborum muscle:

The participant laid on supine lying with one foot over the other on the ankle. The subject was positioned in a side bending position, away from the treated side, consequently that the pelvis was near that side, and the feet and head far from that side (banana shaped). Physiotherapist placed his cephalic hand below the participant's shoulders to hold treated side axilla. The participant was grabbed the physiotherapist's cephalic arm at the elbow with the treated side hand creating the connection further safe. The physiotherapist's caudal hand was positioned on the anterior superior iliac spine on the treated side. The participant was commanded to slightly sideband toward the treated side making an isometric contraction in quadratus lumborum. Then the participant requested to be completely relaxed After 7 seconds, at that moment physiotherapist sideband in the direction of the non- treated side [12].

(2) **Hot and ice packs for group (B):**

Alternating ice and hot packs (20 minutes: 10 minutes hot, 10 minutes cold), 3 times per week for 12 sessions. Hot and cold therapy involves combining and alternating cooling elements and heating elements to combat the pain.

• **Outcome measures:**

The evaluation of the participants in the 2 groups (A and B) was performed in form of pre and post treatment program. Researchers assessed the pain intensity and disability level using Visual analogue scale and Oswestry disability index (ODI).

1. Visual analogue scale: was utilized to quantify the degree of pain before and after treatment. the VAS was a one-dimensional measure of pain intensity, which had been commonly utilized in various adult populations. VAS was a constant scale involved a horizontal (HVAS) or vertical (VVAS) line [13]. VAS is a self-report measure comprising just of a 10 centimeter line with a declaration at both end demonstrating one extreme of the dimension being estimated (most often intensity of pain) A score of 0 was characterized as no pain, and 10 points was characterized as the most severe unbearable pain [14].

2. Oswestry disability index (ODI): The self-completed questionnaire contains ten subjects regarding the pain intensity, raising, capability to care for oneself, capability to walk, ability to sit, sexual function, capability to stand, social life, quality of sleep, and capability to travel. Every subject category is trailed by 6 statements describing diverse possible situations in the patient's life identifying with the subject. Then the patient checked the explanation which furthestmost look like their condition. Every question was scored on a scale of 0–5 with the initial explanation being zero and representing the minimum amount of disability and the last explanation is scored 5 representing most severe disability. The scores for all questions responded to were added, formerly multiplied by two to acquire the index (range 0 to 100). Zero is indicated no disability and 100 is the maximum disability potential [15].

• **Sample size determination**

To calculate the required sample size, pilot study was conducted on 5 subjects in each group. Based on data of VAS, calculations were made using $\alpha=0.05$, $\beta=0.2$ and effect size =0.91 and allocation ratio $N2/N1=1$ and revealed that the required sample size for this study was 20 subjects per group.

• **Statistical analysis**

Unpaired t-test was conducted for comparison of subject characteristics among groups. Normal spreading of data was tested via the Shapiro-Wilk test. Levene's test for homogeneity of variances was conducted to ensure the homogeneity among groups. VAS and ODI were compared between the group A and B by unpaired t-test and

paired t-test was conducted for comparison between pre and post treatment in each group. The level of significance for all statistical tests was set at $p < 0.05$. All statistical analysis was showed through the statistical package for social studies (SPSS) version 22 for windows (IBM SPSS, Chicago, IL, USA).

III- RESULTS

As shown in Table 1, there was no significant difference between the mean values of age, weight, height, and BMI of the study group (A) and control group (B) where their t and p- values were (-0.97, 0.33), (-0.17, 0.86), (0.55, 0.58), and (-0.68, 0.49), correspondingly.

Table (1): Comparison of subject characteristics between group A and B

	Mean \pm SD		MD	t- value	p-value
	Group A	Group B			
Age (years)	28.45 \pm 2.13	29.1 \pm 2.07	-0.65	-0.97	0.33
Weight (kg)	73.75 \pm 5.29	74.05 \pm 5.5	-0.3	-0.17	0.86
Height (cm)	161.9 \pm 3.33	161.35 \pm 2.97	0.55	0.55	0.58
BMI (kg/m ²)	28.11 \pm 1.4	28.4 \pm 1.31	-0.29	-0.68	0.49

SD, Standard deviation; MD, Mean difference; p-value, level of significance

Table 2 represent within and between groups (A&B) comparison mean VAS and ODI pre and post treatment. Before treatment, there was no significant difference between both groups (A&B) ($p > 0.05$). Comparison between the group A and B post treatment showed a significant decrease in VAS and ODI of group A compared with that of group B ($p = 0.0001$). The percentage of decrease in VAS and ODI in the group A was 80.13 and 65.41% correspondingly while that of group B was 51.68 and 15.44% correspondingly.

Table (2): Mean VAS and ODI pre and post treatment of the group A and B:

	Group A	Group B	MD	t- value	p value
	Mean \pm SD	Mean \pm SD			
VAS					
Pre treatment	7.8 \pm 1.06	7.45 \pm 1.05	0.35	1.05	0.3
Post treatment	1.55 \pm 0.68	3.6 \pm 0.88	-2.05	-8.2	0.0001
MD	6.25	3.85			
% of change	80.13	51.68			
t- value	30.7	12.41			
	<i>p = 0.0001</i>	<i>p = 0.0001</i>			
ODI (%)					
Pre treatment	66.5 \pm 9.19	68 \pm 9.78	-1.5	-0.5	0.62
Post treatment	23 \pm 8.33	57.5 \pm 7.52	-34.5	-3.74	0.001
MD	43.5	10.5			
% of change	65.41	15.44			
t- value	21.5	8.76			
	<i>p = 0.0001</i>	<i>p = 0.0001</i>			

SD, standard deviation; p-value, level of significance

IV- DISCUSSION

The results of this study revealed that there was a statistically significant decrease in the mean value of VAS in group A (1.55 \pm 0.68) when compared with its corresponding value in group B (3.6 \pm 0.88) with p value = 0.0001.

Also, the results of this study exposed that there was a statistically significant decrease in the mean value of ODI in group A (23 ± 8.33) when compared with its corresponding value in group B (57.5 ± 7.52) with p value = 0.0001.

There was statistically significant decrease in VAS and ODI post treatment in the group A and B compared with that pretreatment ($p = 0.0001$). The percent of decrease in VAS and ODI in the group A was 80.13 and 65.41% while that of group B was 51.68 and 15.44%.

There was no significant difference between groups (A&B) pre-treatment ($p > 0.05$). Comparison between the group A and B post treatment showed a significant decrease in VAS and ODI of group A compared with that of group B ($p = 0.0001$).

The decrease in pain owing to muscle energy technique (MET) could be extrapolated depend on its neurophysiology, post isometric relaxation indicates to the consequent decrease in tone of the agonist muscle afterward isometric contraction. This happens because of stretch receptors named golgi tendon organ that are situated in the tendon of the agonist muscle. These receptors respond to over stretching of the muscle by hindering the additional muscle contraction. In other practical expressions, intense muscle contraction in contradiction of equivalent counterforce triggers the golgi tendon organ. The afferent nerve impulse from the golgi tendon organs arrives the dorsal root of spinal cord and encounters with an inhibitory motor neuron [16].

The results of this study agreed with that of **Noelle** who found in their study that MET caused significant decrease in nonspecific acute lumbo pelvic pain. They proposed that MET is a depressed force isometric contraction in position without pain and may be carried out without producing additional pain or impairment to the patient [17]. Also, the consequences of this study correspond with the study of **Patil et al.** [18] who reported that application of MET on quadratus lumborum was successful in diminishing disability and increasing spinal range of movement in patients with acute low backache.

As well, the outcomes of this study agreed with the study of **Lauridsen et al.** [19] who stated that MET diminished inability and further developed functional activities in low backache patients. Since MODI depends on low backache with functional activities, so it creates sense that mediation causing ache decrease would additionally be a cause of modification in oswestry disability index (MODI) score.

A study done by **Kumar and Singh** also concluded and reinforced the effectiveness of MET in diminishing pain and inability in patients with nonspecific backache when MET was given 3 times a week for 3 weeks [20]

Also, the results of the study agreed with that recommended that muscle energy technique can be used as a successful treatment in post-partum females with sacroiliac joint dysfunction on pain and disability. Therefore, it will help in improving the quality of life by diminishing the pain and disability related to sacroiliac joint dysfunction. Muscle energy technique was applied for two sequential weeks and the patient encountered pain disappearance. The decrease in pain because of MET may be concluded dependent on its neurophysiology, like illustrated through Chaitow that post isometric relaxation (PIR) denotes to the consequent decline in the agonist tone (quadratus lumborum) muscle after isometric contraction. This happens owing to stretch receptors named golgi tendon organ that exist in the tendon of the quadratus lumborum muscle. These receptors respond to the muscle overstretching by impeding additional muscle contraction. In more technological words, intense muscle contraction contrary to identical counterforce triggers the golgi tendon organ. The afferent nerve impulse from the golgi tendon organ arrives the dorsal root of the spinal cord and meet up with an inhibitory motor neuron [21].

A study completed by **Noelle M Selkow** agrees with the findings of this study by recording that muscle energy technique is an influential technique in diminishing pain in participants with acute low backache and additional study performed through **Roberts BL** wherever he designated two procedures of soft tissue manipulation via neuromuscular procedure and reported that muscle energy technique can lessen pain, spasm of the muscle and stretch muscle fibers [22].

Also, the results of this study disagreed with **Sanika et al.** [23] who studied the effect of 4 weeks gluteus maximus activation exercise and flexion bias exercise program, against MET technique, in subjects with frontally rotated sacroiliac joint dysfunction presented enhancements in functional activities, which was evaluated by Oswestry Disability Index. There was decrease in pain and standardization of pelvic tilt angle which was sustained at the finish of the four-week program with gluteus maximus activation and flexion bias exercise group. Instant enhancements were perceived in pain scores and pelvic tilt angles in frontal rotated sacroiliac joint dysfunction by MET group. So, the effect of 4 weeks gluteus maximus activation exercise and flexion bias exercise program better than the effect of MET technique in treatment of sacroiliac joint dysfunction, this study must be noted with respecting to several limitations. The home program was unsupervised for five days a week for four weeks. Assessor blinding for getting

result measures was not preformed. The age group and chronicity of subjects differs in experimental and control groups.

On the other hand, this study disagreed with study of **García-Peñalver et al.** [24] who studied the effect of the muscle energy technique contrasted with osteopathic manipulation in the management of sacroiliac joint dysfunction in athletes, and generated their results by Gillet test, the standing forward flexion test, and the seated forward flexion test, the thrust technique is greatest efficient than the MET technique in the management of SIJ in middle-distance running athletes. According to these outcomes, a two-time act of the thrust technique is suggested, with the second manipulation occurring a month afterward the first one, the cause being that these yields preferred outcomes over treatment when attempting with SIJ dysfunction. Upcoming areas of study may well be dedicated to the evaluation of thrust and MET manipulative procedures with comparable but more experiments and for longer period, particularly of ladies, to look at the contrasts between genders, or various samples.

V- CONCLUSION

From the outcomes of the study, it can be suggested that muscle energy technique can be used as an effective treatment in postpartum females with sacroiliac joint dysfunction on pain and disability.

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- **Conflicts of interest**

There are not conflicts of interest.

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