



RESEARCH ARTICLE

EFFECT OF MUSCLE ENERGY TECHNIQUE VERSUS STRETCHING EXERCISE ON TREATMENT OF POST NATAL COCCYDYNIA

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ABSTRACT

Back ground: Coccydynia is a pain in the coccyx. It mainly affects females. Approximately 14% of coccydynia occurs due to delivery trauma. Muscle Energy Technique (MET) and stretching exercises are mainly used to treat the musculoskeletal disorders. **Aim of the study:** The aim of this study was to compare between the effect of muscle energy technique and stretching exercise in the management of post-natal Coccydynia. **Methods:** Forty volunteers, multi-Parus females subjects suffering from Coccydynia after six weeks post-partum. Their age were ranged between 25-35 years and BMI were not exceed 30 Kg/m². They were detected randomly assigned into two groups equal in number. group A (n=20) and group B (n=20). group A received muscle energy technique exercise 3 times per week for 12 sessions. group B received stretching exercise 3 times per week for 12 sessions. **Results:** There was a significant decrease in VAS and ODI post treatment in the group A and B compared with that pre treatment ($p < 0.001$). The percent of decrease in VAS and ODI in the group A was 58.46 and 61.09% while that of group B was 55.22 and 56.82%. There was no significant difference between groups pre-treatment ($p > 0.05$). Comparison between the group A and B post treatment revealed non significant difference in VAS and ODI between groups ($p > 0.05$). **Conclusion:** There was no significance difference between muscle energy technique and stretching exercise in management of post-natal coccydynia.

INTRODUCTION

Coccydynia is a painful condition in the coccyx region, the prevalence of Coccydynia is unknown, it most commonly occurs in adolescents and adults, although children are sometimes affected. It affects females five times more than males; the higher prevalence is thought to be due to injuries that occur during childbirth (1,2) Its major cause is hypermobility of coccyx or its subluxation. It occurs due to direct trauma on the coccyx, vaginal delivery, unknown cause. Most of the patients suffer from pain while sitting on a hard surface which is exaggerated by rising from sitting (1,3,5,6). Coccydynia, may be due to ligamentous traction with or without displacement of the coccyx or aggravation of a previous injury. Occasionally a coccyx may spontaneously fracture during the 2nd stage of labor. It can be a painful and incapacitating condition in the early post-partum period. It can interfere with the mother baby bonding process. The most common symptom is pain in the tail bone, the pain may be worsened in prolonged sitting position and with hip extension activities, such as stair climbing (7). Most of the cases resolve within weeks to months with or without conservative treatment, but for a few patients, the pain can become chronic and debilitating.²

If the symptoms persist and are not responsive to conservative management, Coccydynia is done as a surgical treatment (8). Therapeutic massage, cryotherapy, hot packs, ultrasound and myofascial release are some modalities in physiotherapy used for treatment of these cases. Cold produces vasodilatation which occurs later, and then the alternate flushing effect could usefully help to reduce pain. Heat produces a hyperemia within the muscle which resolves the ischemia and reduce pain. Where pain is the result of nociceptors stimulation by the chemicals produced or released as a result of trauma or inflammation, a local increase in circulation could remove these chemicals and therefore reduce pain (9) Muscle Energy Technique (MET) is a manual therapy technique which uses voluntary contraction of a patient's muscle with a correctly controlled direction against a distinctly therapist counter-force. Much research suggested using MET in the treatment of shortened muscles, muscle weakness, restricted joints and edema (10). MET is one of the three most commonly used techniques applied by American Osteopaths in treatment. From the field of manual therapy, some studies have researched the effectiveness of MET and reported promising results. Given the fact that MET is a commonly applied therapeutic intervention, relevant and inexpensive.

Health problems for which a true gold standard is lacking, and that there is some evidence of its effectiveness, the effort of a comprehensive systematic review seems warranted (11). 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 rehabilitation techniques, such as strengthening exercises, to decrease pain and enhance the effect of an applied exercise program. (12,13) There are many advantages for applying MET, one of which includes 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 (14). In conclusion, this technique is not painful or harmful to the patient. The therapist provides resistive force counter to push patients' muscle contraction, aimed to help in restoring musculoskeletal functions (12,13,14)

Previous research has found that MET of the low back improved self-report of disability when used with supervised neuromuscular re-education and resistance exercise training, but the effect of MET as an isolated treatment has not been determined (15,16). Stretching is a form of physical exercise in which a specific muscle or tendon (or muscle group) is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone. The result is a feeling of increased muscle control, flexibility, and range of motion. Stretching is also used therapeutically to alleviate cramps (17,18). The use of stretching exercise can stimulate mechanoreceptors of the skeletal muscles which regulate parasympathetic and sympathetic activities because stretching the muscles to their fullest length will release stress (19). Stretching can be dangerous when performed incorrectly. There are many techniques for stretching in general, but depending on which muscle group is being stretched, some techniques may be ineffective or detrimental, even to the point of causing hypermobility, instability, or permanent damage to the tendons, ligaments, and muscle fiber (20). Pain that lasts longer than 3 months (chronic pain) may require weeks or months of regular stretching to successfully reduce pain. Stretches may be included as part of a physical therapy program, and/or recommended to be done at home on a daily basis (21). A recent study finds that people with Coccydynia benefited from performing exercises to increase thoracic spine mobility and to stretch the piriformis and iliopsoas muscles in the buttocks and hips (20).

Therefore, it was proposed to study the effects of stretching of piriformis and iliopsoas in reduction of pressure pain threshold and improvement in pain free sitting duration in persons with Coccydynia. These exercises reduce the participants' pain when sitting and increased the amount of pressure that they could withstand on the lower back before feeling pain (20).

SUBJECTS, MATERIALS AND METHODS

Subjects: Forty volunteers, multi-Parus female subjects suffering from Coccydynia after six weeks post-partum. Their age were ranged between 25-35 years and BMI were not exceed 30Kg/m². They were detected randomly from The Outpatient Clinic of Obstetrics and Gynecology in EL Rahmaniya Hospital in Bahira.

The women were randomly assigned into two groups equal in number. group A (n=20) and group B (n=20) by an independent person who was select numbers from sealed envelopes containing numbers was chosen by a random number generator.

Group A:

This group consisted of twenty patients with post-natalcoccydynia. All were received muscle energy technique exercise with home program, 3 times per week for 12 sessions.

Group B: This group consisted of twenty patients with post-natalcoccydynia. All were received stretching exercise with home program 3 times per week for 12 sessions.

Ethical consideration: Purposes of the study, methodology and experiments protocol were explained to every patient participated in the study and they agreed to share in this study.

Ethical committee: Ethical approved from Scientific Researches Ethical Committee of Faculty of Physical Therapy, Cairo University. NO.P.T.REC/012/002383 .

MATERIALS

1. Informed consent form.
2. Recording data sheet: all data and information of each patient who participated in this study including name, age, address, weight and height were recorded in recording data sheet.
3. Standard weight and height scale: will be used to measure weight & height to calculate body mass index (BMI) for each patient in both groups (A&B) before beginning of the study.
4. Visual analogue scale: will be used to measure the level of pain for both groups A&B before and after treatment.
5. Functional ability assessment (The Oswestry Disability Index) (ODI) will be asked to be filled.

Methods

All patients were given a full explanation of the protocol of the study and consent form were signed for each patient before participating in the study.

Evaluation procedures:

Examination: All the following assessment were done as mentioned above in the examination modality's part to all the subjects in both groups (A) and (B) before and after the treatment program.

Weight and height scale: Weight and height were measured for each patient in both groups (A&B) before treatment to calculate the body mass index (BMI) according to the following equation:

$$\text{BMI} = \text{weight (Kg)} / \text{height (m)}^2 \quad (23)$$

Visual analogue scale (VAS): Visual analogue scale is 5 cm calibrated line with 0(zero) representing no pain and 5 representing worst pain, were used to assess the severity of pain before and after treatment for all patients in both groups (A&B). Every patient of both groups (A&B) were asked to

mark on the line that represents her level of pain before and after treatment.²⁴

Functional ability assessment (The Oswestry Disability Index) (ODI): The (ODI) has become one of the principal condition-specific outcome measures used in the management of spinal disorders. The ODI measures disability of the spine in a patient, using a 10-item scale and these are evaluated by 0–5 scores. The categories are pain severity, self-care, walking, sitting, standing, sexual function, travelling, and social life. The extreme score in ODI is 50, which means 100% disability. Every participant answered the ODI questionnaire before and after treatment to detect the level of functional disability. A higher score is usually associated with severe pain and debility. The ODI remains a valid and confident measure and has been a worthwhile outcome measure (25).

Treatment procedures: Group (A) were treated by muscle energy technique exercise for the following muscles:

- Hip flexors muscles.
- Quadratus Lumborum muscles.
- Erector spinae muscles.
- piriformis muscles.

Group (B) were treated by stretching exercise for the following muscles:

- Piriformis muscle.
- Iliopsoas muscle.
- Lower back muscle.

RESULTS

Statistical Analysis: Unpaired t-test was conducted for comparison of subject characteristics between groups. Normal distribution of data was checked using the Shapiro-Wilk test. Levene's test for homogeneity of variances was conducted to ensure the homogeneity between 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 conducted through the statistical package for social studies (SPSS) version 22 for windows (IBM SPSS, Chicago, IL, USA).

Results

Subject Characteristics: Table (1) showed the subject characteristics of the group A and B. There was no significant difference between groups in age, weight, height and BMI ($p > 0.05$).

Effect of treatment on VAS and ODI:

Within group comparison: There was a significant decrease in VAS and ODI post treatment in the group A and B compared with that pre treatment ($p < 0.001$). The percent of decrease in VAS and ODI in the group A was 58.46 and 61.09% while that of group B was 55.22 and 56.82%. (Table 2).

Between groups comparison: There was no significant difference between groups pre-treatment ($p > 0.05$). Comparison between the group A and B post treatment revealed non significant difference in VAS and ODI between groups ($p > 0.05$) (Table 2).

DISCUSSION

Post-partum coccydynia is most commonly seen secondary to hormonal changes, which occur during the third trimester of pregnancy. These changes induce a softening of the synchondrosis between the sacrum and coccyx, increases the mobility of the ligaments and surrounding muscles, causing inflammation (22). This pain in the coccyx may radiate to hip and lumbar regions. The pain or tenderness may be aggravated by prolonged sitting, arising from seated position, leading back while seated, prolonged standing and walking, so the pain interferes with all the activity of the women, making it difficult for her even to sit to feed herself and her baby. Sometimes there is a pain with defecation or the patient feel a frequent need to defecate, the patient may feel pain during sexual intercourse or aggravated during menstruation and premenstrual period. Unfortunately, the literature review was unable to identify any study addressing the effect of muscle energy technique in treating post-partum coccydynia. Consequently, the purpose of this study was to evaluate the effect of muscle energy technique in treating such cases (22).

The physiological mechanisms underlying the therapeutic effects of MET were unclear and may involve a variety of neurological and biomechanical mechanisms, including hypoalgesia, altered proprioception, motor programming and control, and changes in tissue fluid. 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 or muscles. MET may have physiological effects, regardless of the presence or absence of dysfunction (14,15). Varghese, has stated that function of any articulation of the body which can be moved by voluntary muscle action, either directly or indirectly can be influenced by MET procedure, so this may stretch tight muscles, strengthen weak muscles and mobilize a restricted articulation.

Also, the change in muscle expansibility may be due to the mechanism of analgesia and increase in stretch tolerance. When MET was applied with therapeutic exercise for more than one session, this may have greater effect on outcome (12,13). Similarly, the touch of the clinician, along with stimulation of agonist and antagonist muscles, seems to alter perception of pain. This technique could be performed prior to other rehabilitation techniques, such as strengthening exercises, to decrease pain and allow more efficient exercises to be executed. This technique may be better than others in decreasing pain for several reasons. The time it takes to administer MET is very short (less than 1 minute). It also allows the clinician to have physical contact with the patient, helping the patient to trust the clinician. Lastly, MET is a low-force isometric contraction in a pain-free position. This technique can be accomplished without causing further pain or harm to the patient (20).

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)	30.1 \pm 3.33	29.35 \pm 2.39	0.75	0.81	0.41
Weight (kg)	74.25 \pm 5.37	74.9 \pm 4.49	-0.65	-0.41	0.68
Height (cm)	162.4 \pm 3.34	162.15 \pm 2.85	0.25	0.25	0.8
BMI (kg/m ²)	28.11 \pm 1.23	28.49 \pm 1.06	-0.38	-1.06	0.29

SD, Standard deviation; MD, Mean difference; p value, Probability value

Table 2. Mean VAS and ODI pre and post treatment of the group A and B

	Group A		Group B			
	Mean \pm SD	Mean \pm SD	MD	t- value	p value	
VAS						
Pre treatment	3.25 \pm 1.2	3.35 \pm 1.3	-0.1	-0.25	0.8	
Post treatment	1.35 \pm 0.58	1.5 \pm 0.61	-0.15	-0.79	0.43	
MD	1.9	1.85				
%Of change	58.46	55.22				
t- value	8.32	6.32				
	p = 0.001	p = 0.001				
ODI (%)						
Pre treatment	54.1 \pm 13.46	56.05 \pm 13.12	-1.95	-0.46	0.64	
Post treatment	21.05 \pm 5.72	24.2 \pm 8.63	-3.15	-1.36	0.18	
MD	33.05	31.85				
% Of change	61.09	56.82				
t- value	11.19	8.77				
	p = 0.001	p = 0.001				

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

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 the dysfunctional soft tissues. MET can be used to relax tight, tense musculature, spasms, or fibrotic changes due to chronic soft tissue problems. MET has several uses that can help increase muscle strength, increase range of motion (ROM), and decrease edema (10). MET was used as a common conservative treatment and a gentle manual therapy for restricted motion of the spine and extremities for pathology around the spine, particularly lumbopelvic pain (10,12,13). Stretching exercises will be performed to increase thoracic spine mobility. stretch the piriformis and iliopsoas muscles in the buttocks and hip will be done. This exercise will decrease tension in the tail bone. These exercises will reduce the participants' pain when sitting and increased the amount of pressure that they could withstand on the lower back before feeling pain.

Conclusion

There was no significance difference between muscle energy technique and stretching exercise in management of coccydynia.

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