

Effectiveness of muscle energy technique as compared to Maitland mobilisation for the treatment of chronic sacroiliac joint dysfunction

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Abstract

Objective: To compare the effectiveness of Muscle Energy Technique (MET) with Maitland mobilisations when using lumbopelvic stability exercises as an adjunct therapy with them in reducing pain and disability in patients with sacroiliac joint dysfunction (SIJD).

Methodology: A randomised controlled trial was conducted at physical therapy departments of Khyber Teaching Hospital, Lady Reading Hospital and Rehab Polyclinic, Peshawar, Pakistan and comprised of data over a to a six-month period from January 2015 to June 2015. Sixty participants (both male and female with an age range of 25-55 years) were randomly assigned to two equal groups of 30 (50%) each by chit-box method. Group-A of 30 patients (experimental group) was treated with Muscle Energy Technique (MET). Group-B of 30 patients (control group) was treated with Maitland Mobilizations at sacroiliac joint. Lumbopelvic stability exercises were given to both groups. The treatment outcomes were measured on the first day and then after 4 weeks (12 sessions) from each subject's pain and disability levels by using Visual Analogue Scale (VAS) for measuring pain and Modified Oswestry Disability Index (MODI) for measuring disability.

Results: The paired sample statistics for intra-group analysis of the VAS and MODI showed a significant difference in values i.e. for Group-A, VAS was 16.699 with p-value 0.000 and MODI was 29.125 with p-value 0.000 while for Group-B, VAS was 18.687 with p-value 0.001 and MODI was 28.607 with p-value 0.001. The independent samples test for inter-group analysis of pre-VAS and post-VAS were 0.662 with 0.510 p-value and 1.000 with 0.321 p-value respectively while of pre-MODI and post-MODI were -1.482 with 0.144 p-value and -0.114 with 0.909 p-value respectively This showed an insignificant difference in pain and disability outcomes between the groups.

Conclusion: MET and Maitland mobilisations are both effective in treating the chronic sacroiliac joint dysfunction when using lumbopelvic stabilisation exercises as an adjunct therapy with them.

Keywords: Sacroiliac Joint Dysfunction (SIJD); Muscle Energy Technique (MET); Maitland Mobilizations; Lumbopelvic stability exercises; VAS (Visual Analogue Scale); MODI (Modified Oswestry Disability Index). (JPMA 70: 1693; 2020)

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Introduction

The "sacroiliac (SI) joint (SIJ) dysfunction (SIJD)" indicates a pain in the SI joint region that is usually caused by either too much movement (hypermobility) or too little movement (hypo mobility) at the joint resulting in an irritation of the joint.^{1,2} The mechanical SIJD typically causes a dull ache at the base of the spine on the affected side. The nature of pain can worsen and 'sharpen' during the activities such as sitting, bending, lifting, standing up from a seated position, or lifting the knee up to the chest during stair climbing. Sometimes the pain can be referred to the groin, buttock or the back of the thigh but rarely goes below the knee.^{3,4} Since it is believed that the SI joints connect the lumbar spine to the pelvis and there is relatively little motion

occurring at these joints, so most of the motion in the pelvis area is either at the hips or the lumbar spine. These joints have to support the entire weight of the upper body in an erect posture that implies a large amount of stress across them. Any dysfunction in these joints can produce a severe low back and hip pain. It affects individuals of all occupations and activity levels.⁴ Approximately 60% to 80% of adult population suffers from low back pain (LBP) in their lives.⁵ In majority of LBP cases, the main cause is SIJD dysfunction.^{5,6} Schwarzer et.al reported that SI pain is found to occur in at least 13% and as high as 30% in patients with low back pain and buttock pain.⁶ The main causes of SIJD are hypermobility, i.e., ligamentous laxity and hypomobility, i.e., degenerative joint disease, trauma, hormonal imbalance, unilateral weak lower limb, reversal of concavo-convex locking relationship of SI joint, scoliosis, lumbar spinal fusion, spondyloarthropathies, hip osteoarthritis, femoroacetabular impingement, leg-length inequality,

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poor-quality footwear, biomechanical or muscle length imbalances.^{7,8} A possible pain mechanism associated with SIJ dysfunction comes from a number of areas like a muscle imbalance, ligamentous sprain/strain, sacral or ilial misalignment etc.⁹ One of the contributing element is "joint dysfunction" that includes loss of joint play movement.¹⁰ The other factor is "muscle dysfunction" in which the SI joint itself remains unaffected but its surrounding muscles are suffering from a dysfunction. This muscular non-equilibrium produces a limitation in the flexibility of low back muscles, which ultimately results in a chronic disuse syndrome that includes decreased range of motion (ROM), reduced function and increased pain.^{9,11} It is confirmed through patient's history and physical examination that includes straight leg raising (SLR) test, prone knee bending test, Gillet test, ipsilateral anterior rotation test, Forton's sign, Flamingo test, Faber's test, Trendelenburg test, leg length tests, SI compression and distraction test, sacral & thigh thrust test, Mennell's test and Gaenslen's test.¹² In SIJ dysfunction there is a history of fall directly on the buttocks or an unexpected step of a curb that significantly results in a jolt through the lower extremity or any sudden trunk movements resulting in the SI strain.¹³ Most of the time sitting decreases the pain while standing and walking increase the pain.¹⁴ The accurate location of symptoms is quite helpful in determining whether SIJD exists or not. It is seen frequently with patients of SIJD that they point out with one finger or place their whole fist over the region of posterior superior iliac spine (PSIS). This is known as Forton's sign^{13,14} and it has demonstrated a very high reliability index in identifying SIJD. A comprehensive approach to managing SIJD includes rest, medical management, physical therapy and surgery (joint fixation) as a last resort.^{3,15} The physical therapy management consists of a large number of approaches i.e. manual therapy, electrotherapy (e.g. Transcutaneous Electrical Nerve Stimulation (TENS) unit, cryotherapy, hydrotherapy, ultrasound etc), soft tissue mobilisation techniques, therapeutic exercises and lumbopelvic stability exercises.^{1,4,8} Research examining the treatment methods independently are widely available, yet no single research has directly examined the comparative effects between Maitland mobilisation and MET when using lumbopelvic stability exercises as an adjunct therapy with them for improving pain and disability in SIJD. Thus, the objective of the current study is to evaluate as well as to generalise the comparative effects of these selected interventions for SIJD in our setting.

Methodology

A randomised controlled trial was conducted at the physical therapy departments of Khyber Teaching Hospital, Lady Reading Hospital and Rehab Polyclinic, Peshawar Pakistan and comprised of data over a six month period a six-month period from January 2015 to June 2015. The RCT was registered at the Iranian Registry with a Trial number of IRCT-20190618043930-N1. Sixty participants (both male and female) were randomly assigned to two equal groups of 30 (50%) each by chit-box method. Group-A of 30 patients with an average age of 36.53 ± 7.005 years and Group-B of 30 patients with an average age of 37.00 ± 8.23 years were inducted for the study. The inclusion criteria was unilateral back pain emerging around or close to the sacral sulcus; positive muscle length tests i.e. piriformis, iliopsoas and quadratus lumborum; weakness in ipsilateral gluteus maximus, contralateral latissimus dorsi and abdominals with an abnormality in SIJ integrity. Every subject volunteered for his/her inclusion in the study with criteria of no pain radiation, no lumbar disc prolapse and no spinal deformity. Every subject had duly signed an informed consent and therefore the rights of every subject were protected. Group-A was treated with MET that was applied on quadratus lumborum, iliopsoas and piriformis muscles of the affected side for 1 set of 5 repetitions with 10 sec hold. Group-B was treated with SIJ mobilisations; 30 oscillations/set, 3 sets/one side. Lumbopelvic stability exercises were given to both groups, which were targeted to the ipsilateral gluteus maximus, contralateral latissimus dorsi and abdominals in 3 sets of 10 reps with 10 sec hold. The outcome variables were measured on the first day and then after one month of treatment administration from every subjects' pain and disability through a Visual Analogue Scale (VAS) and Modified Oswestry Disability Index (MODI). The data analysis was done through SPSS software system version 20. A paired sample t-test was used for intra-group analysis of the values of VAS and MODI whereas, an independent samples t-test was used for inter-group analysis of VAS and MODI readings. The p-value was set at <0.05 .

Results

A total of 60 participants satisfied the inclusion and

Table-1: Baseline parameters.

Variables	Group A (N=30)	Group B (N=30)
Age	36.53 ± 7.006	37 ± 8.23
VAS	7.67 ± 1.34	7.43 ± 1.38
MODI	28.33 ± 4.68	30.27 ± 5.39

VAS:Visual Analogue Scale, MODI:Modified Oswestry Disability Index

Table-2: Comparison of outcome measures within Group-A.

Outcome Measures	Pre-test value	Post-test value	t-value	p-value
VAS	7.67±1.34	4.33±1.34	16.69	0.00
MODI	28.33±4.68	9.20±3.12	29.13	0.00

VAS:Visual Analogue Scale, MODI:Modified Oswestry Disability Index

Table-3: Comparison of outcome measures within Group-B.

Outcome Measures	Pre-test value	Post-test value	t-value	p-value
VAS	7.43±1.38	4.0±1.20	18.69	0.01
MODI	30.27±5.39	8.30±3.69	28.61	0.00

VAS:Visual Analogue Scale, MODI:Modified Oswestry Disability Index

exclusion criteria out of 74 assessed participants. The response rate was 100%. The age range for the study was 25-55 years. The mean age of group-A and group-B was 36.53±7.006 and 37±8.23 respectively. There was an insignificant difference with regards to the mean age of group-A and group-B. Hence, both the groups were comparable in terms of age.

The distribution of men and women between the two groups were similar, however women comprised 62% of the participants in the study showing that women are more prone to develop the SIJD than men.

The baseline values of outcome measures are listed in Table-1. Comparison between pre and post Visual Analog Scale score and Modified Oswestry Disability Index score has been done for group A (Table-2) and B (Table-3) using paired sample t-test. Comparison between pre and post Visual Analog Scale Score and Modified Oswestry Disability Index Score has been done in between group A and B using Independent samples t-test (Table-4).

The mean score of pre-VAS and pre-MODI for group-A was 7.67±1.348 and 28.33±4.686 respectively and for group-B was 7.43±1.382 and 30.27±5.394 respectively. The mean score of post-VAS and post-MODI for group-A was 4.33±1.373 and 9.20±3.123 respectively and for group-B was 4.00±1.203 and 8.30±3.687 respectively. The paired sample t-test statistics of the VAS and MODI for group-A were 16.699 with p-value <0.005 and 29.125

Table-4: Comparison of outcome measures between-Groups.

Outcome Measures	Pre-Test Value		t-value	p-value	Post-Test Value		t-value	p-value
	Group-A	Group-B			Group-A	Group-B		
VAS	7.67±1.34	7.43±1.38	0.66	0.51	4.33±1.34	4.0±1.20	1.00	0.32
MODI	28.33±4.68	30.27±5.39	-1.48	0.14	9.20±3.12	8.30±3.69	-0.11	0.91

with p-value <0.005 respectively. This showed that there is a significant difference in values within group-A. The paired sample t-test statistics of the VAS and MODI for group-B were 18.687 with p-value 0.001 and 28.607 with p-value 0.001 respectively. This showed that there is a significant difference in values within group-B. The independent samples t-test between the groups for pre-MODI and post-MODI were -1.482 with p-value 0.144 and -0.114 with p-value 0.909 respectively. This showed an insignificant difference in disability outcome between the two groups. The independent samples t-test between the groups for pre VAS and post VAS were 0.662 with p-value 0.510 and 1.000 with p-value 0.321 respectively. This showed an insignificant difference in pain outcome between the groups.

Discussion

In the recent study, we investigated the effectiveness of MET and Maitland mobilisations along with lumbopelvic stabilisation exercises on the level of pain and disability in the patients with chronic SIJD. The changes observed in this study from 0 day to 30th day of intervention were remarkable. The pain and disability of the subjects were assessed two times pre-intervention and post-intervention through VAS and MODI respectively.

An intra-group analysis showed significant changes in the improvement of pain and disability level in both groups i.e. group-A and group-B. Although the data obtained from inter-group analysis revealed an insignificant difference in values which showed that none of the group had produced better results than the other in improving pain and disability level.

An improvement in pain level due to MET could be evidenced based on its particular neurophysiology as explained by Chaitow that post-isometric relaxation leads to a subsequent decrease in the agonist muscle tension after an isometric contraction.¹⁶ It usually happens because of the specialized stretch receptors called Golgi Tendon Organs that normally reside in the tendon of the agonist muscle. Lewit confirmed this finding that an increased tone in the affected muscles with subsequent pain and dysfunction could be resolved by restoring the full functional length of the muscle.¹⁷ A research performed by Noelle M. Selkow et.

al subsequently strengthens the findings of the current study by concluding that MET was quite useful in reducing the pain and disability levels in subjects with an acute low back pain due to SIJD.¹⁸ Furthermore, in a study performed by Roberts BL where he investigated two different techniques of soft tissue manipulation, i.e., neuromuscular technique and MET, he concluded that MET could alleviate the pain intensity, muscle rigidity as well as lengthens the shortened or spasmodic muscle fibers.¹⁹ The effectiveness of MET on the level of disability is highly supported by the research of Capt. Eric Wilson, who evaluated that MET had greatly reduced the disability level and improved the functions in subjects with acute low back pain due to SIJD.²⁰

The comparison of pre and post values of pain and functional disability was done within a group treated with Maitland mobilisations at SIJ and significant results were obtained. According to Maitland, pain in SIJ would usually disappear when treated with appropriate mobilisation.¹¹ Further, he suggested that minor positional faults (not readily palpable or visible on X-rays) occur following injury or strain resulting in movement restrictions or pain, but when correctional mobilization is sustained, pain-free function could be restored and several repetitions bring about lasting improvements.^{10,11} So in the present study, this could be the potent reason of pain relief in group treated with the Maitland mobilisation at SIJ.

Moreover, the lumbopelvic stabilisation exercises had provided the additional effects to the treatment outcome. As seen in the study conducted by Vleeming et al, that an effectiveness of these stability exercises was remarkable in reducing pain and disability, and in increasing the strength by improving the force closure in patients with chronic SIJD.²¹

As Modified Oswestry Disability Index is based on low back pain associated with activities of daily living, so it is obvious that any treatment procedure that could reduce pain would also bring about an improvement in the score of Modified Oswestry Disability Index.²² The findings of the current study also evidenced an improvement in the levels of pain and disability.

The limitations of the current study were the intensity or the extent of resisted force that was applied by the patient during the technique cannot be measured and the patients did not refrained from their normal daily functions which could be a causative or aggravating factor for low back pain during their treatment intervals.

Conclusion

In the light of the current study, it was evident that MET and Maitland mobilisations were both effective in treating the chronic SIJD in terms of decreasing pain and disability when using lumbopelvic stability exercises as an adjunct therapy.

Conflicts of Interest: None to declare.

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Disclaimer: I declare that the manuscript is a part of my Master of Science thesis project.

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