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Original Research Article

Comparison between Muscle Energy Technique and Mulligan's Mobilization with Movement in Patients with Anterior Innominate Iliosacral Dysfunction

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ABSTRACT

The aim of the study was to compare the effectiveness of Muscle Energy technique (MET) over Mulligan's Mobilization with movement (MWM) on pain and functional disability in patients with Anterior Innominate Iliosacral Dysfunction, 30 patients with Anterior Innominate Iliosacral Dysfunction were included in the study and divided in to two groups. Both groups were treated with ultrasound therapy. In addition, Group A was treated with MET and Group B was treated with MWM. Pre and post intervention Pain (Visual Analogue Scale) and Functional disability (Modified Oswestry Disability Index) measures were noted at 0^{th} and 6^{th} session. At the post intervention, the inter group comparison showed statistically significant difference for both pain ($p=0.013$) and functional disability ($p=0.002$). The intra group comparison showed statistically significant difference ($p<0.05$) in both groups. This study concluded that both MET and MWM were effective in reducing pain and improving functional ability. While MET was found to be more effective than MWM in anterior innominate iliosacral dysfunction.

Key Words: Sacroiliac Joint Dysfunction (SIJD), Anterior Innominate Iliosacral Dysfunction, Muscle Energy Technique (MET), Mulligan's Mobilization with Movement (MWM).

INTRODUCTION

The sacroiliac joint (SIJ) is an underappreciated cause of low back and pelvic pain, as well as source of pain to proximal lower extremity. [1] It is a recurrent subject of controversy, [2] but several authors state that the SIJ is a potential source for pain in the lumbar spine and buttock area. [3] The SI joint pain arose below L5, S1 and in particular if there was associated groin pain. It is a nociceptive source of low back pain. [4] Sacroiliac Joint pain has no Specific distribution and is similar to the pain arising from other lumbosacral structures. There are no provoking or relieving movements or positions that are unique or especially common to SIJ pain. [5]

The prevalence for SIJ dysfunction as a primary source of low back pain is reported from 0.4% [6] to 35% [7] to 98%. [8] This disparity is partly explained by the lack of valid criteria that prevalence can be judged by. [9] Prevalence studies are further

compromised by the fact that most have used either physical examination findings and/or radiological imaging techniques to make the diagnosis of SI joint pain. [10] There are evidences where sacroiliac joint pain was treated with modalities like Transcutaneous Electrical Nerve Stimulation (TENS) and Ultrasound (US) [11] and manual therapy techniques like Muscle Energy Technique, [12] Mulligan's Mobilization with movement [20] and Manipulation. [13]

Muscle energy technique (MET) is a common conservative treatment for to treat various pathological conditions of the spine, particularly lumbopelvic pain (LPP). MET is considered a gentle manual therapy for restricted motion of the spine and extremities. [14] And is an active technique where the patient, not the clinician, controls the corrective force. [15] MET requires the patient to perform voluntary muscle contractions in a precise direction, while the clinician applies a counterforce not allowing movement. For many years, MET has been favoured to treat muscle imbalances of the lumbopelvic region and pelvis asymmetry. Unfortunately, few studies have investigated the effectiveness of MET.

The Mulligan's Mobilization with movement (MWM) is a class of manual therapy techniques that is widely used in the management of musculoskeletal pain. It involves the manual application of a sustained glide by a therapist to a joint while a concurrent movement of the joint is actively performed by the patient [16] and again unfortunately there is lack of studies examining its effectiveness.

MATERIALS AND METHODS

A single-blind (Patient) randomized clinical trial was conducted in physiotherapy OPD of Dr. Hedgewar Hospital, Mahatma Gandhi Mission's Medical College and Hospital and Aurangabad Institute of Medical Sciences Hospital and Trauma Centre. The Clinical research Ethical Committee approved this study prior to subject enrolment.

The inclusion criteria were as follows: 1) Patient aged 18 and over with an acute episode of Lumbopelvic pain within previous 6 weeks with pain radiating till the knee and associated groin pain. For the clinical diagnosis of iliosacral dysfunction the cluster of pain provocation tests [1] were used. While to assess the anterior innominate dysfunction a thorough physical examination followed by standing flexion test, sitting flexion test, long sitting test and Gillet's test were carried out. [17]

The exclusion criteria were as follows: 1) Pregnancy, 2) Ankylosing Spondylosis, 3) Presence of neurological signs, 4) Absence of deep tendon reflexes, 5) SLR Less than 45°, 6) Pain radiating past the knee. 6) H/O previous back surgery, 7) or had been diagnosed by physician with a diagnosis other than SIJD.

Forty Seven patients fulfilling inclusion and exclusion criteria were recruited after assessing 200 patients. The written informed consent of the subjects was obtained prior to baseline examination. The baseline assessment included visual analogue scale and modified Oswestry disability index. The primary outcome measure was pain intensity. An unmarked visual analogue scale of 100 mm, anchored with 'no pain' at one end and 'most severe pain' on other, was used. The participants were asked to register the worst pain intensity that perceived in a day. The secondary outcome measure was functional status which was measured using modified Oswestry disability index score, in this score the sum totals of activities of daily living are used, resulting in maximum possible score 50 points. [18] The assessment was carried out pre treatment0thsession and post treatment 6th session.

After baseline assessment the patients were randomized in two interventional groups using simple random sampling. The group A received six sessions of Muscle Energy technique (Post Isometric Relaxation). [19] While group B received six sessions of Mulligan's mobilization with movement. [20] Additionally both groups

received ultrasound therapy with frequency of 1MHz, 50% duty cycle and intensity of 0.08 W/cm^2 for duration of six minutes over affected SI joint. [12]

In order to maximise standardization the researchers took part in a training session and provided with instruction on manual therapy techniques and data collection procedure used in study.

Statistical Analysis

Descriptive statistics was calculated for all variables. Quantitative variables and their differences are expressed as mean, standard deviation (SD). The paired t test was used for within-group analysis to find out the differences from baseline to post - treatment assessment, while unpaired t test was used for between-group analysis at pre-treatment and post-treatment assessment. The level of significance was set at alpha = 0.05 and limits of confidence interval at 95%. For the statistical analysis SPSS version 20.0 software (SPSS Inc., Chicago. IL. USA) was used.

RESULTS

47 participants satisfied the inclusion and exclusion criteria out of 200 assessed participants. 17 participants were lost to follow up assessment sessions. It was not possible to contact those participants for follow up. The baseline values of outcome measures were 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 't' test. The results were significant for both groups with P<0.0001.

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 Unpaired 't' test. When comparison of mean and SD between the group A and B were done for pre values of VAS (p=0.323) and MODI (p=0.553) there was an insignificant result (Table 1). While for post values of VAS (p=0.013) and MODI (p=0.002) there was a significant result (Table 4).

Table 1: Baseline Parameter

Variables	Group A (N=15)	Group B (N=15)	t value	df	95% Confidence interval of difference	P value
Age	34.06 ± 10.20	35.06 ± 10.10	-0.27	28	-8.593 to 6.593	p=0.789
VAS	7.71 ± 1.13	7.28 ± 1.18	1.005	28	-0.442 to 1.296	p=0.323
MODI	55.2 ± 18.86	51.33 ± 16.32	0.6	28	-9.329 to 17.063	p=0.553

Table 2: Comparison of outcome measures within-group A

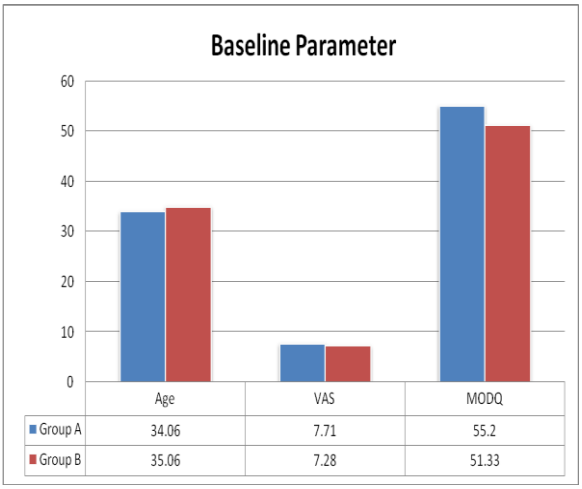
Outcome measures	Pre Assessment	Post Assessment	t value	df	95% Confidence interval of difference	p Value
VAS	7.71 ± 1.13	1.73 ± 1.11	19.683	14	5.328 to 6.631	P<0.0001
MODI	55.2 ± 18.86	11.4 ± 6.63	9.42	14	33.827 to 53.772	P<0.0001

Table 3: Comparison of outcome measures within-group B

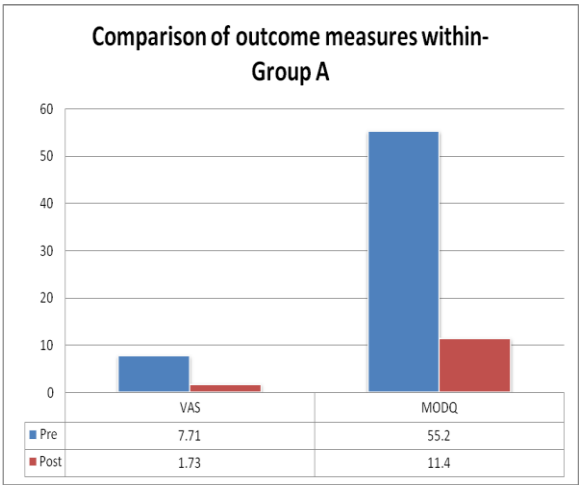
Outcome measures	Pre Assessment	Post Assessment	t value	Df	95% Confidence interval of difference	p Value
VAS	7.28 ± 1.18	3.04 ± 1.56	12.079	14	3.487 to 4.992	P<0.0001
MODI	51.33 ± 16.32	21.33 ± 9.14	12.048	14	24.659 to 35.340	P<0.0001

Table 4: Comparison of outcome measures between-groups at post Intervention

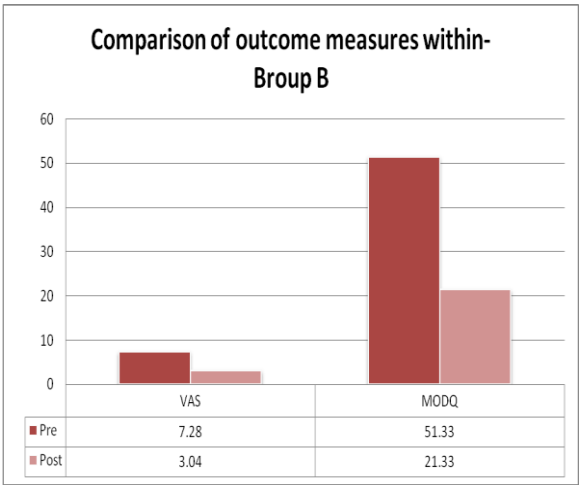
Outcome measures	Group A (N=15)	Group B (N=15)	t value	df	95% Confidence interval of difference	p - Value
VAS	1.73 ± 1.11	3.04 ± 1.56	-2.644	28	-2.330 to -0.295	p=0.013
MODI	11.4 ± 6.63	21.33 ± 9.14	-3.405	28	-15.908 to -3.958	p=0.002



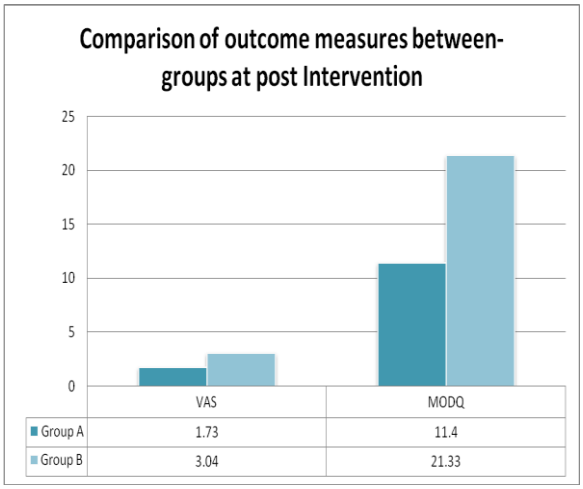
Graph 1: Baseline Parameter



Graph 2: Comparison of outcome measures within-group A



Graph 3: Comparison of outcome measures within-group B



Graph 4: Comparison of outcome measures between-groups at post Intervention

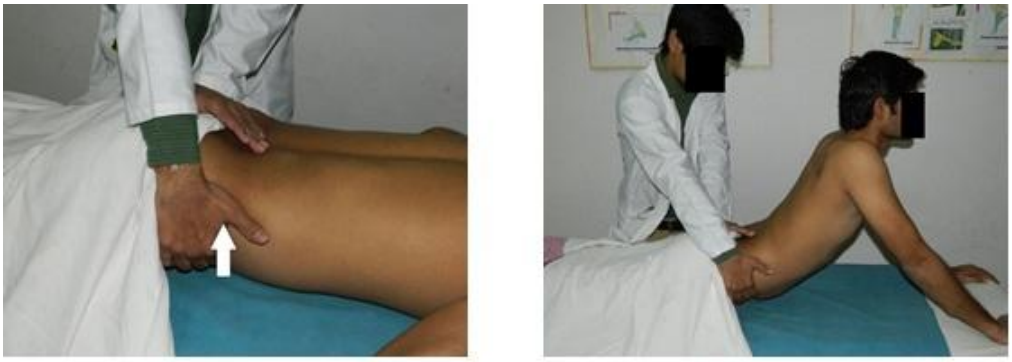
Muscle Energy Technique for Anterior Innominate Iliosacral Dysfunction

The patient lies prone and the therapist stands at the side to be treated, at waist level. The affected leg and hip are flexed and brought over the edge of the table while the Therapist grasps the foot/ankle area between his/her legs. The table hand stabilizes the sacral area while the other hand supports the flexed knee and guides it into greater flexion, inducing the posterior iliac rotation. Once the barrier engaged the patient is then asked to attempt to straighten the leg against underlying resistance, for 10 seconds using no more than 20% of available strength. On releasing the effort, and on complete relaxation, and on an exhalation, the leg is guided to its new barrier. The technique is performed for 3 times with 5 seconds rest interval in each repetition.

MET for anterior Innominate Iliosacral Dysfunction

Mulligan's Mobilization with Movement for Anterior innominate Iliosacral dysfunction

The patient lies prone and therapist stand opposite side of dysfunction. Therapist then fixates the sacrum with thenar eminence of left hand and places the fingers of other hand under the ASIS. Therapist then pulls up the ileum and asks patient to do the 10 half press ups, provided these are pain free and followed by 2 sets of press-ups with 10 repetitions.



A. Hand Placement B. Press ups

Mulligan's MWM for Anterior Innominate Iliosacral Dysfunction

with

Ultrasound for Anterior Innominate Iliosacral Dysfunction

Patients from both group received ultrasound [12] with frequency of 1 Mhz, intensity of 0.8 W/Cm^2 and duty cycle of 50% for duration of 6 min over affected SI joint.

Ultrasound For Affected Sacroiliac Joint

DISCUSSION

The aim of this randomized clinical trial was to compare the effect of Muscle energy Technique and Mulligan's Mobilization Movement in patients with Anterior Innominate Iliosacral Dysfunction. While analyzing the outcome measures of this study, it was observed that significant improvements were found in both the groups, but Muscle Energy technique group showed better results than that of Mulligan's Mobilization with Movement group on both variables i.e. pain and functional disability thereby supporting the experimental hypothesis. Based on the VAS and MODI measures, we found the effectiveness of each treatment technique individually. Result of the study showed that in group treated with Muscle energy technique there was significant decrease in pain and functional disability while comparing pre and post intervention. This is in agreement with previous study done by Selkow N.M. [12] suggesting that the Muscle energy technique leads to better outcomes in treatment of anterior innominate iliosacral dysfunction when looking at the short-term effects worst pain over the past 24 hours.

CLUSTURE OF TETS USED FOR SIJD EVALUATUION

FABER's Test

Gaenslen's Test

Thigh Thrust Test

Resisted Abduction test

Standing Forward Flexion Test

Sitting Forward Flexion test

Supine to Sit (Long Sitting) Test (A)

Supine to Sit (Long Sitting) Test (B)

Supine to Sit (Long Sitting) Test (C)

Gillet's Test

The results showed 78.01% improvement in pain and 77.31% improvement in functional disability. Furthermore the results are also supporting with those of Vaughn H.T. [11] who also found that Muscle energy technique and taping techniques leads to better outcomes in treatment of Anterior innominate iliosacral dysfunction.

Hamstrings is a group of tendons consisted by three posterior thigh muscles i.e. semitendinosus, semimembranosus and biceps femoris. All three muscles originate from the ischial tuberosity while their insertions are different. The semitendinosus inserts over medial surface of tibia, the semimembranosus inserts over medial tibial condyle while the biceps femoris inserts over lateral side of the head of the fibula. The combined action of all these three muscle is hip extension and knee flexion. Over time it has been studied that unilateral muscle tightness of hamstrings can produce rotational forces in the innominate and this is particularly true for unilateral loading or kicking. [21] A tight rectus femoris could produce anterior-inferior rotation force on the anterior superior iliac spine, while a tight biceps femoris could produce posterior-inferior rotational force at the ischial tuberosity and sacrum. [22] So the SIJ dysfunction has also been associated with hamstrings spasm, in which there is posterior-inferior rotation of the innominate due to hamstrings spasm. [23]

As described by Selkow N.M. [12] the MET can be used to correct an asymmetry in innominate rotations 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. The MET technique used in this study works on both principals of MET i.e. Reciprocal Inhibition and Post isometric relaxation technique. The contraction of hamstrings causes a reflexive reciprocal inhibition of the quadriceps allowing innominate movement unopposed by quadriceps torque. While the post isometric relaxation of hamstrings helps in placing it in new barrier thus stretching the muscle and causing posterior inferior innominate rotation.

Unfortunately, few studies have examined the effectiveness of MET on SIJD. At present, the treatment window and lasting effect of a single MET session is undefined and a thorough research is needed in the same.

The comparison of pre and post values of pain and functional disability is done within group treated with Mulligan's Mobilization of movement and a significant result is seen. According to Brian Mulligan [20] pain in sacroiliac joint will usually disappear when treated with appropriate mobilization. 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 is restored and several repetitions bring about lasting improvements. The reason mulligan gave to confirm the hypothesis is that mobilization with movement is nearly always at right angles to the plane of movement and will work in only one direction. When correct MWM is repeated several times, the joint memory to stay on track seems to return. This is supported by Miller J. [24] in his research.

It has been hypothesized that mulligan's MWM reduces minor positional faults at joints. This hypothesized mechanism of action is based on a premise that a minor positional fault results following joint injury [25] and that these faults are largely responsible for the pain and observed limitation of movement. [26] Although many authors putatively ascribe their observations of beneficial clinical effects to the correction of bony positional faults, few studies have directly evaluated this proposal. Hsieh et al. [27] reported a case study post traumatic thumb injury, where the positional fault was identified on MRI, which was reversed during the application of the MWM, but not after discharge; despite full resolution of the thumb pain and

impairment. So in present study this can be the potent reason of pain relief in group treated with the Mulligan's Mobilization with movement.

In addition, no participants in either group reported adverse effects/discomfort with intervention. In light of these findings, it is recommended that further research be conducted to determine the utility of this protocol in patients with no improvement in pain and functional ability. Therefore it is suggested that the manual therapy techniques should be added in our day to day clinical practice.

CONCLUSION

This study concluded that both Muscle Energy Technique and Mulligan's Mobilization with Movement is effective in both variables i.e. pain and functional ability status. But when both groups are compared with each other, the Muscle Energy Technique is effective than that of Mulligan's Mobilization with Movement.

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