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A study on the Efficacy of Muscle Energy Technique as compared to Conventional Therapy on Lumbar Spine Range of Motion in Chronic Low Back Pain of Sacroiliac Origin

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ABSTRACT: Sacroiliac joint dysfunction is a term often used to describe pain in and around the region of the joint that is presumed to be due to biomechanical disorders of the joint. Despite of high incidence, the contribution of sacroiliac joint to low back pain has been a matter of controversy. Physical therapists routinely assess spinal range of motion in patients with low back pain and believe that spinal range of motion and disability are closely linked. The present study was aimed to determine the relative efficacy of Muscle Energy Technique as compared to Conventional Therapy on lumbar spine range of motion in chronic low back pain of Sacroiliac origin. It was found that the subjects who were treated with Muscle Energy Technique showed greater improvements in lumbar spine range of motion as compared to Conventional Therapy Group. As far as reduction in pain and disability are concerned both the groups showed almost similar results. The study concluded that sacroiliac joint dysfunction affects lumbar spine range of motion and is a significant contributor to chronic low back pain.

Key words: Chronic low back pain, Sacroiliac joint dysfunction, Lumbar spine range of motion, Conventional therapy, Muscle energy technique.

INTRODUCTION

Low back pain (LBP) is extremely common and has a major societal impact. About 40% of people say that they have had LBP within the last 6 months (Von Korff et al, 1988). The sacroiliac joint (SIJ) is an integral part of both the lumbar spine and the pelvic girdle. It is frequently the source of low back pain and pelvic girdle pain (Cusi, 2010). The contribution of sacroiliac joint to LBP has been a matter of controversy with a prevalence ranging from 22.5-62.8% (Greenman, 1992; Bernard and Cassidy, 1999). Sacroiliac joint dysfunction (SIJD) is a term often used to describe pain in and around the region of the joint that is presumed to be due to biomechanical disorders of the joint e.g. hypomobility, malalingment, fixation, subluxation (Dreyfuss et al, 1996).

Despite its frequency, the diagnosis and treatment of SIJ dysfunction has been poorly defined in the literature (Zelle et al, 2005). The clinical diagnosis for SIJD rests upon focused history and physical examination. Physical therapists routinely assess spinal range of motion (ROM) in patients with LBP and believe that spinal ROM and disability are closely linked (Battie et al, 1994). However literature does not witness studies on assessment of lumbar spinal range of motion in SIJD except a case report of Cibulka (1992) and Erhard and Bowling (1977).

The treatment of SID remains controversial as well. The osteopathic approach incorporates joint specific manipulative techniques in order to restore normal joint mechanics (Cibulka et al, 1988). Physical therapy strategies emphasize manual correction of SIJ asymmetry, use of physical modalities lumbo pelvic stabilization and correction of muscle imbalance (Don Tigny, 1985). However outcome data following management of SIJD are limited and randomized controlled trials comparing different treatment methods are needed (Zelle et al, 2005).

The purpose of this study is twofold. One to determine the effect of SIJD on pain, disability and lumbar spinal range of motion in patients with chronic LBP and secondly to compare the efficacy of Conventional therapy and Muscle Energy Technique (MET) in its management.

MATERIAL AND METHODOLOGY

30 patients 24 females and 6 males aged 30 – 50 yrs (41 ± 7.61) , with a height of 158 ± 7.34 cm and weight of 66.2 ± 10.59 kg whose primary reported symptom was chronic LBP were included for the study.

Inclusion Criteria:

1. Chronic LBP of greater than 3 months duration
2. Subjects aged between 30 – 50 yrs
3. Tenderness over the sacroiliac joint, particularly on the sacral sulcus (Fortin finger test)
4. Mechanical LBP
5. Sacroiliac joint hypomobility
6. Positive three out of four common tests of movement and symmetry for SIJD.
7. Positive three out of five pain provocation tests for SIJD.

Exclusion Criteria:

1. Acute injury or fracture
2. During pregnancy
3. Inflammatory pathology
4. Presence of neurological signs such as any abnormal sensibility, abnormal DTR's, profound muscle weakness and SLR less than 45 degrees.
5. Any hip joint pathology
6. Spondylolisthesis/Stenosis/disc disease.
7. History of any major lumbar spine surgery.
8. Congenital spinal anomaly.
9. Hypermobility of SI joint
10. Sacralization of the lumbar vertebra or lumbarization of the sacral vertebra.
11. True leg length discrepancy as in polio or postfracture cases.
12. Subjects taking analgesics.

Tools used for the study

1. **Positive three out of four common tests for SIJD**

Cibulka and Koldehoff (1999) suggested using a combination of symmetry and movement tests to determine whether a patient has dysfunction in the SIJ region and reported high intertester agreement (k=.88). They determined that dysfunction in the SIJ was present in a patient if at least 3 out of 4 tests were positive: the standing flexion test, the prone knee flexion test, the supine long sitting test, and palpation of PSIS heights in sitting position.

2. **Positive three out of five pain provocation tests for SIJD**

Robinson et al, (2007) suggested that the cluster of 3 out of 5 pain provocation tests (compression test, distraction test, posterior pelvic pain provocation test, faber's test, bilateral and unilateral internal rotation of hip) were found to be reliable, so the cluster of tests should be validated for assessment of diagnostic power.

3. **Visual Analogue Scale (VAS)**

VAS ranging from 0 to 10 cm was used to measure the pain.

4. **Measuring Tape**

Lumbar spine flexion and extension ROM measurement was done using MMST (modified modified schober test) (William et al, 1993).Lumbar spine side flexion ROM was measured using finger tip to floor method.

5. **Revised Oswestry Disability Index** (Fairbank et al, 1980).

Protocol

The subjects who met the inclusion / exclusion criteria were made to sign an informed consent and then randomly assigned to two groups:

Group I - Experimental group

Group II - Conventional Therapy group

Out of 30 subjects half were assigned to Group I and other half to Group II. The subjects in both the groups were measured for VAS score, Lumbar spine ROM, and Oswestry disability index on Day 1 prior to treatment.

Intervention in the Experimental group

The subjects in the experimental group were given MET appropriate for the dysfunction identified (Chaitow, 2001). For each of the technique used, the restriction barrier (i.e. where no further movement was appreciated) was identified and the subjects were instructed to make a contraction of about 20 - 30% of maximum voluntary isometric contraction, hold it for 8–10 secs, relax for 2-3 secs and then the limb was moved passively in to a new barrier. This procedure was repeated for about 4-6 times.

Fig.1: MET for Anterior Innominate

Fig.2: MET for posterior Innominate

Intervention in the conventional therapy group

The subjects in this group were given therapeutic ultrasound (for 5 mins, intensity of $1W/cm^{2}$) and TENS (for 10 mins 50-100 Hz), the intensity being monitored by the sensation felt by the patient along with the mobility exercises i.e. knee to chest exercise and pelvic rotation to either side with a hold of 10 secs in each position and for 8–10 repetitions.

Both groups were treated for 6 days, after which the outcome measures were reassessed post treatment on Day 6.The patients in both groups were taught mobilization and stabilization exercises at discharge.

Data Analysis

Data analysis was done using paired t test for intragroup analysis and unpaired t test for intergroup analysis.

RESULTS

1. Visual Analogue Scale

There was a significant reduction in VAS scores in both the groups at p<0.001 (Fig.3). When intergroup comparison for VAS scores was done, the intergroup differences were significant at a p value of <0.05 (Fig. 4) with better pain control in the Conventional Therapy group.

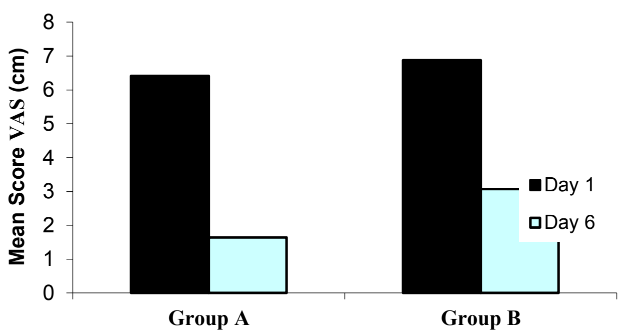

Fig.3: Intragroup comparison of VAS score (cm)

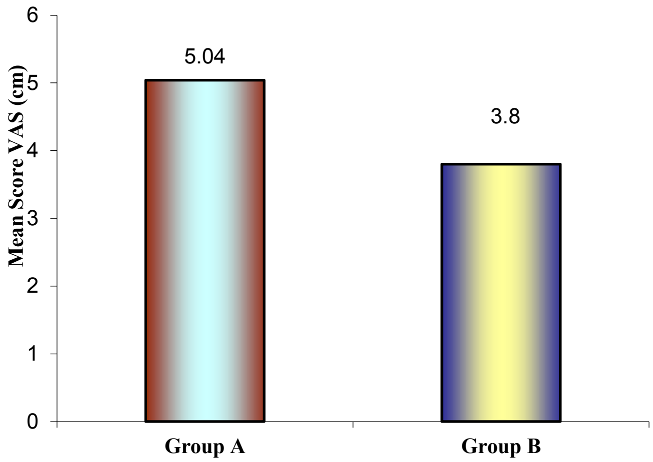

Fig.4: Intergroup comparison of VAS (cm) after 6th Day

2. Revised Oswestry Disability Index

There was a significant reduction in disability score (ODI) in both the groups at p<0.01 (Fig.5). The intergroup differences for ODI at any level were not significant (Fig.6).

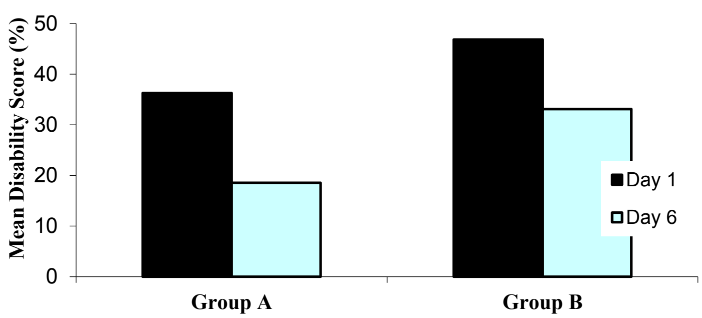

Fig.5: Intragroup comparison for disability score (%)

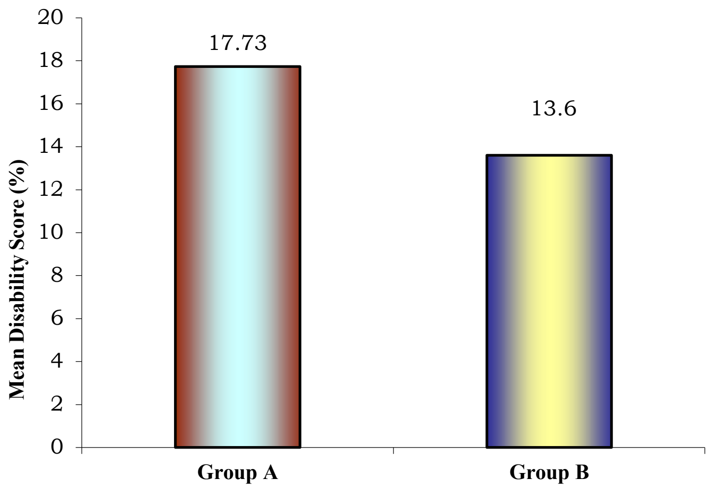

Fig.6: Intergroup comparison for Disability Score after 6th Day

5. Lumbar spine ROM

For **Lumbar Flexion ROM** the mean values for Group I and Group II showed significant increase in ROM on Day 6 in both groups (Fig.7). The intergroup differences for Lumbar Flexion ROM were not significant (Fig.8).

For **Lumbar Extension ROM** the mean values for Group I (MET) showed significant ($p<0.05$) increase in ROM on Day 6 .The mean values for Group II did not show any significant increase in ROM (Fig.9). The intergroup differences for Lumbar Extension ROM were not significant (Fig.10).

For **Lumbar Side Flexion ROM** the mean values of side flexion to Right in both Groups showed significant ($p<0.05$) increase in ROM. The mean values towards left side in both groups were not significant (Fig.11). The intergroup differences for Lumbar Side flexion ROM were not significant (Fig.12).

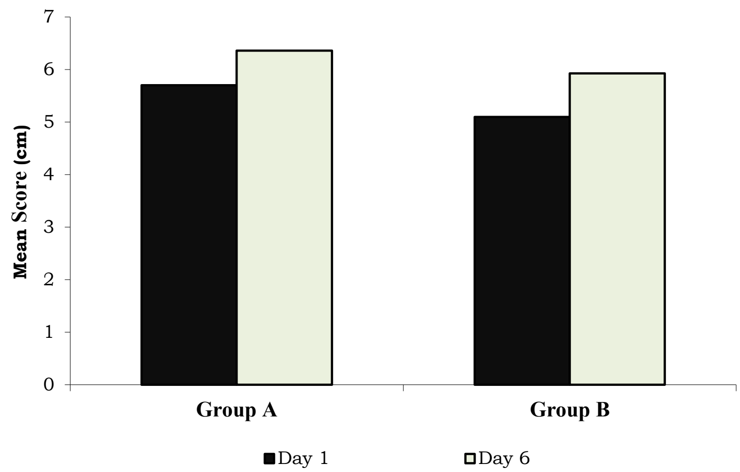

Fig.7: Intragroup comparison for Lumbar Flexion ROM (cm)

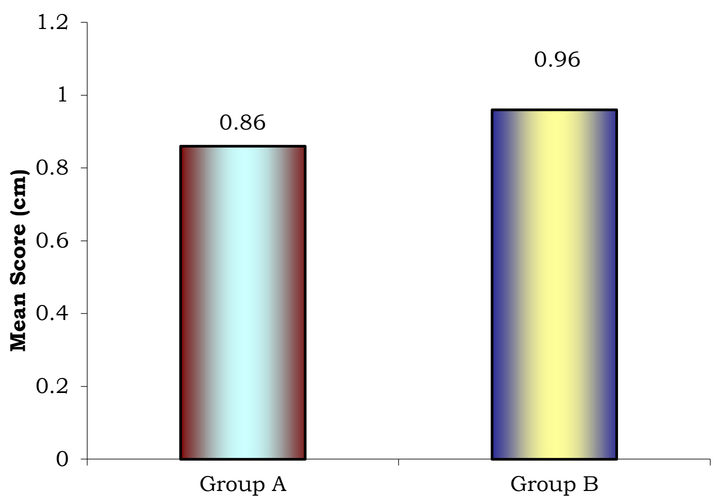

Fig.8: Intergroup comparison for Lumbar Flexion ROM (cm) after 6th Day

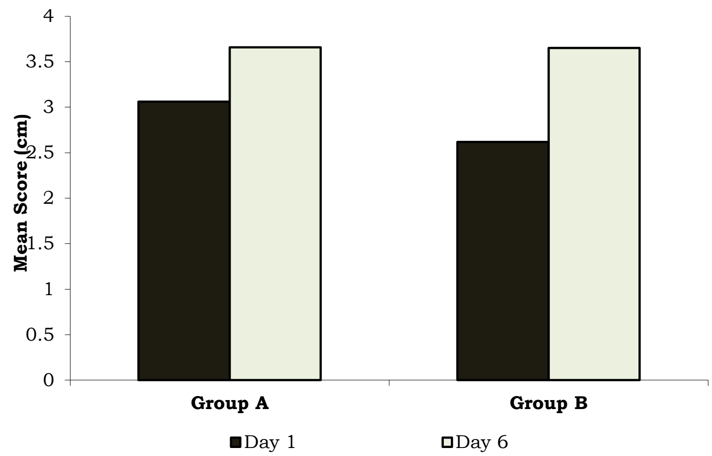

Fig.9: Intragroup comparison for Lumbar Spine Extension ROM (cm)

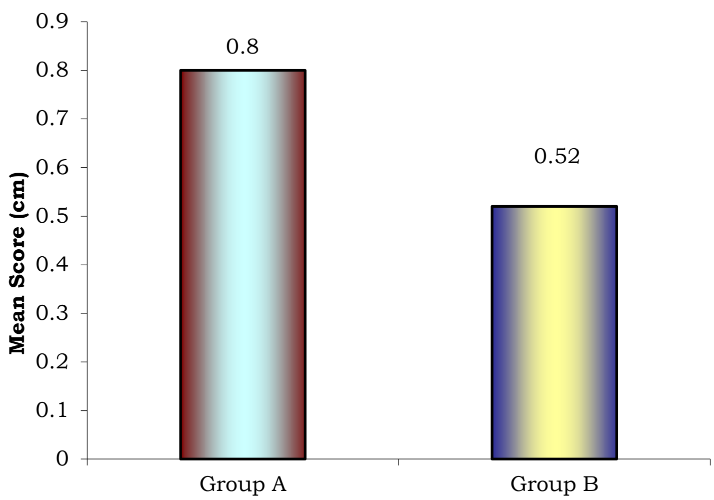

Fig.10: Intergroup comparison for Lumbar Spine Extension ROM (cm) after 6th Day

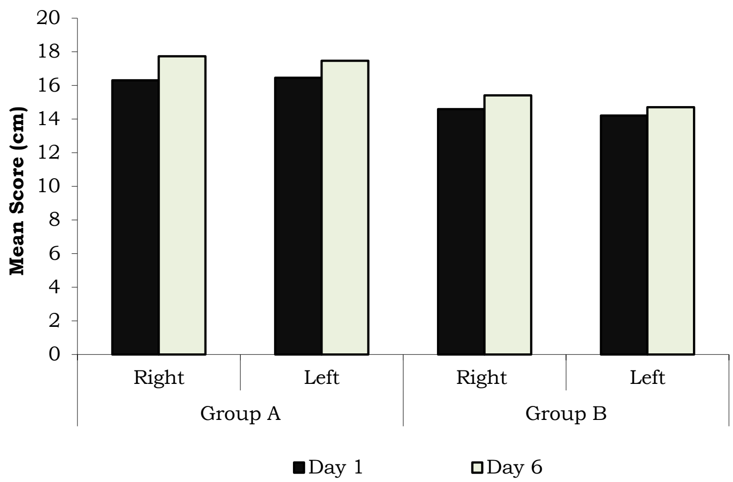

Fig.11: Intragroup comparison for Lumbar Side Flexion ROM (cm)

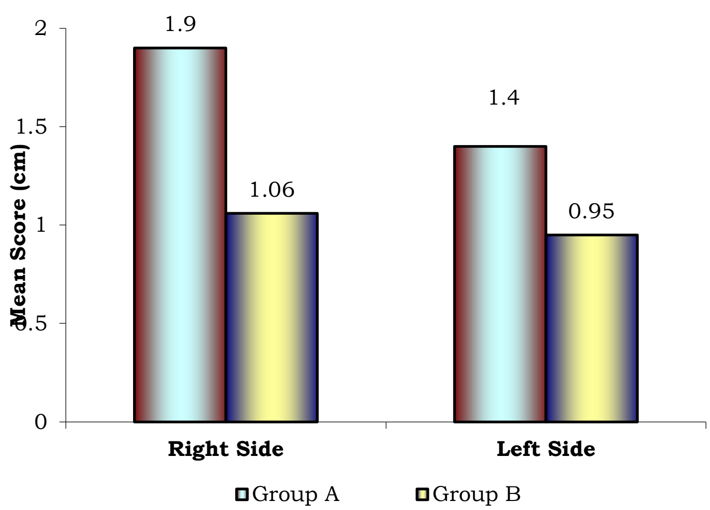

Fig.12: Intergroup comparison for Lumbar Side Flexion ROM (cm) on right and left sides after 6th Day

DISCUSSION

The results of the study have revealed that SIJD is a significant contributor to LBP and the resultant disability. The results also depict that there is some limitation of lumbar spine flexion, extension and side flexion ROM (especially on same side) in subjects having SIJD (26 out of 30 patients had a dysfunction on right side). The probable reason being that a hypomobile sacroiliac joint may stress surrounding or intervening tissues of one or both sacroiliac joints and they fail in their presumed function of dissipating force from head and trunk above or from the ground below. Most of the muscles of the pelvis have an attachment to the lumbar spine (iliopsoas, multifidus, quadrates lumborum) which can influence it directly or indirectly and any imbalance in them can lead to a dysfunction (Vleeming et al, 1989). The association of side flexion of the patient towards the side of sacroiliac joint dysfunction has also been reported in the studies done by Cibulka (1992); Erhard and Bowling (1977).

Multiple treatments of sacroiliac dysfunction have been adopted by various disciplines that treat LBP, but there are no prospective trials that have evaluated the effect of restoration of spinal ROM in the SIJD. The present study has indicated that there was a significant reduction in VAS score (i.e. pain) and resultant disability in both the groups with almost similar results, with better pain relief in Conventional Therapy group. The better pain control in the Conventional Therapy group can be explained in the light of the fact that application of ultrasonic therapy may control pain as a result of stimulation of the cutaneous thermal receptors, increased soft tissue extensibility or changes in nerve conduction (Foster et al**,** 1999). TENS may reduce the sensation of pain by interfering with its transmission at the spinal cord level (Don Tigny, 1985). The mobility exercises help to lengthen the shortened soft tissue structures that lead to hypomobility and increased stresses on the articulation.

Subjects treated by MET have shown significant improvement in lumbar spine flexion, extension and side flexion on affected side as compared to Conventional Therapy group. Greenman, (1996) 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 can be used to lengthen a contractured, hypertrophic or tight muscle or strengthen a physiologically weak muscle, relieve passive congestion and oedema. All of these factors contribute to chronic musculoskeletal pain which can be reduced successfully using MET. In addition MET is a form of non impulse based manipulative therapies and current literature suggests that most patients with SIJD benefit from manipulation (Zelle et al, 2005). Thus conventional therapy and MET together may be successfully used for management of a patient with SIJD.

Conclusion

The present study concludes that SIJD is a significant contributor to chronic LBP and resultant disability; it must be ruled out in each and every subject suffering from chronic LBP of greater than 3 months duration. It can be diagnosed on the basis of history and cluster of physical tests and can be successfully managed using MET along with Conventional Therapy. The study has also shown the relationship between lumbar spine ROM and SIJD which can be restored by using MET along with Conventional therapy.

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