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Effect of muscle energy technique on pain pressure threshold in sacroiliac joint dysfunction

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ABSTRACT

Patients with conjectured sacroiliac joint dysfunction (SIJD) commonly complaints of tenderness and pain around the posterior superior iliac spine (PSIS). The tenderness can be objectively recorded using pain pressure threshold (PPT) as an outcome measure. However, to date, no studies have been conducted to ascertain the effect of muscle energy technique (MET) on PPT. Consequently, the study aims to determine the effect of MET on PPT in SIJD. Twenty-five SIJD patients who fulfilled the inclusion criteria participated in the study. Outcome measures like PPT, Visual analogue scale (VAS), and Oswestry disability index (ODI) was taken prior to the intervention and also after 4-day treatment sessions. There was a significant improvement ($p<0.05$) seen in all the outcome measures. The study concluded that MET could be beneficial in reducing tenderness around PSIS and also helps in reducing pain and disability in patients with SIJD.

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INTRODUCTION

Sacroiliac joint (SIJ) is considered as a troublesome and one of the nociceptive source of low back pain (LBP) (Laslett, 2005). Sacroiliac joint dysfunction (SIJD) is defined as an aberrant position of the innominate, which may or may not produce pain (Laslett, 2008). The accepted prevalence of SIJD in Indian population with persistent LBP is 16-17% (Srivastava, 2018). Clinical findings include pain over the posterior superior iliac spine (PSIS), referred pain to groin, greater trochanter, buttock, medial and posterior thigh, calf and foot. Pain worsens during weight-bearing, stair climbing, and the patient usually limps (Donatelli and Wooden, 2009). Physiotherapists use diverse methods to treat SIJD like electrotherapy modalities, exercises, and manual therapy. Muscle Energy Technique (MET) is a manual therapy, seen to be extensively used in the treatment of SIJD (Franke, 2015). MET is an active treatment technique which involves voluntary contraction of the tightened muscles of the patient against the resistance provided by the therapist in a controlled direction (Wilson, 2003). It helps in improving the mobility of a restricted joint, enhances the length and strength of tightened muscle, and reduces edema (Fryer, 2011).

Patients with SIJD commonly point out at the PSIS for localized pain and tenderness (Fortin's finger test) (Fortin and Falco, 1997). Tenderness present around the PSIS is considered to be a vital sign in the diagnosis of SIJD (Forst, 2006; Leeuwen, 2016). A recent clinical diagnostic rule suggested to examine the tenderness around the PSIS and incorporate it in the assessment of SIJD along with the pain provocation tests (Petersen *et al.*, 2017). Therefore, it is

imperative to find out the effect of MET around the PSIS.

Manual examination of tenderness around the PSIS is done by using a pressure test, but the test fails to standardize the pressure exerted by the finger and thereby make its interpretation ambiguous (Leeuwen, 2016). Algometer or pain pressure threshold (PPT) is an objective tool which can quantify the tenderness perceived by the patient on the application of pressure (Leeuwen, 2016). The reliability of this tool is moderate to good with ICC ranging between 0.60 and 0.82 (Leeuwen, 2016). The diagnosis of SIJD is confirmed when two out of four pain provocation tests (compression, distraction, sacral thrust and femoral thrust) (Laslett, 2005)and three out of four tests of symmetry and movement (heights of the posterior superior iliac spine (PSIS), standing flexion test, prone knee flexion test, and supine to long sitting test) are positive (Cibulka and Koldehoff, 1999).

Previous studies have demonstrated the efficacy of MET in overall pain and disability due to SIJD. However, none have focussed on the tenderness around the PSIS, which is a crucial sign in the diagnosis of SIJD. Consequently, the study aims to see the effect of MET on tenderness around the PSIS using PPT in patients with SIJD.

METHODOLOGY

The study was carried out from December 2016 till April 2017 in the department of physiotherapy, KS Hegde Medical Hospital, Mangalore. It is a single group pre-post design study. The study was given an ethical clearance by the central ethical committee of the Nitte (deemed to be) University. The present study is a part of an ongoing larger RCT, using power 90%, the sample size was calculated.

Seventy-two potential SIJD patients diagnosed and referred by a physician were screened for the inclusion and exclusion criteria. Patients were included if they were between 20-65 years of age, patients with unilateral subacute or chronic LBP, pain below L5 vertebra, pain around the PSIS, two positive pain provocation tests out of four (compression, distraction, sacral thrust and femoral thrust) (Laslett, 2005) and three positive tests of symmetry and movement out of four (heights of the posterior superior iliac spine (PSIS), standing flexion test, prone knee flexion test, and supine to long sitting test) (Cibulka and Koldehoff, 1999). Patients with central LBP, spondylolisthesis, lumbar stenosis, ankylosing spondylitis, rheumatoid arthritis, signs of radiculopathy, true limb length discrepancy and SIJD due to pregnancy were excluded. Written informed consent was obtained from all the patients. The outcome measures like PPT, visual analogue scale (VAS) and Oswestry Disability Index (ODI) were taken before the intervention and also after four days of the intervention by a blinded assessor. PPT was recorded by digital algometer. The patients were made to lie in a prone position. The therapist placed the probe of the algometer 1cm below the PSIS and applied a perpendicular force. The patients were asked to report the first pain perceived. Three readings were taken in a gap of 1 minute (Leeuwen, 2016). The mean was calculated as a final score. VAS is a subjective scale used to assess pain. It consists of a 10cm line with grading from 0-10. Where 0 denotes no pain and 10 indicates the worst pain ever. The patients were instructed to mark a point on this line to denote the intensity of their pain. ODI is a tool which evaluates the functional disability due to LBP. It is a self-completed questionnaire consisting of 10 questions. All the patients were asked to complete the questionnaire and scoring was calculated in percentage.

Intervention

During the preliminary screening and examination, patients were identified with either anterior or posterior rotation of the innominate. The intervention was provided by a manual therapist with seven years of experience in treating LBP and pelvic dysfunctions. The treatment session was repeated three times within a gap of a few seconds between each repetition. The total duration of intervention was four days.

MET for anterior rotated innominate

The patient was positioned in supine. The hip and knee of the affected side were flexed until the barrier was felt. The patient was then asked to extend the hip against the therapist's shoulder isometrically for seven seconds.

MET for posterior innominate

The patient was positioned in supine. The affected side's leg was placed outside the couch, and the hip was pushed by the therapist into the extension to achieve a barrier. The patient was then asked to flex the hip against the therapist's palm placed over distal thigh isometrically for seven seconds.

Data analysis

Analyses were done using the Statistical Package for Social Science (SPSS) version 16.0. At 95% confidence interval p-value <0.05 was considered to be statistically significant. The analysis was done using a paired t-test to compare pre and post scores.

Table 1: Intra group comparison using paired T test

Outcome measure	Pre score mean(±S.D)	Post score mean(±S.D)	Mean difference	P-value
Pain pressure threshold (Newton)	26.95(±13.84)	39.86(±12.24)	12.91	0.005*
Visual analogue scale (CM)	8.2(±1.84)	4.26(±2.02)	3.94	0.001*
Oswestry disability index (%)	41.96(±15.04)	26.72(±12.07)	15.24	0.001*

*P value < 0.05 is significant

RESULTS AND DISCUSSION

Seventy-two patients with SIJD were screened for eligibility. Of which 25 were enrolled in the study. Fourteen male and eleven female patients with a mean age of 40.24 (±12.14) and 39.24 (±11.92) received four sessions of treatment. There were no dropouts or adverse events reported during the study. Increase in scores of PPT, decrease in VAS, and ODI scores were recorded after the intervention (Table 1).

MET is a popular manual therapy technique utilized in treating pain and disability in SIJD. However, no studies are conducted to demonstrate its effect on tenderness around PSIS using PPT. The present study was done to ascertain the effect of MET on tenderness around PSIS. The study found positive results in reducing tenderness, pain and improving disability in patients with SIJD following four sessions of MET. A study compared MET with traditional physiotherapy in patients with SIJD. At the end of six sessions, the author demonstrated a significant reduction in pain and disability in both groups (Bindra, 2013). A study was done to demonstrate the effect of MET on pain and function in SIJD. The patients were treated for either inflare or outflare using MET. The study noted a significant improvement in pain and a reduction in disability (Joshi, 2017). A clinical trial was conducted to find out the effect of MET on pain and disability in SIJD patients. The patients were given either MET with mobilization of SIJ or only mobilization. Both the groups were improved concerning to pain and disability after nine sessions of intervention (Sharma and Sen, 2014). Our results are in accordance with the aforementioned studies. Along with the reduction in pain and disability, we also found a significant decrease of tenderness around PSIS.

According to Janda, a classic muscle imbalance pattern is observed in SIJD (Slipman, 2001). The iliopsoas, piriformis, gluteus maximus, hamstrings, and tensor fascia latae develop tightness and gluteus maximus, multifidus, and vastus medialis oblique develops weakness (Slipman, 2001). Such imbalance can potentially lock the SIJ in a mal-aligned position and produce pain. Tight hamstrings and gluteus maximus or iliopsoas and rectus femoris can lock the pelvic bone in posterior or anterior rotation, respectively (Schamberger, 2013). In our study, MET was given either for tight hamstrings and gluteus maximus or iliopsoas and rectus femoris. Application of MET probably reversed the tightness of the above-mentioned muscles and thereby, the malalignment of the joint would have been corrected. MET alleviates tenderness and pain according to the Pain Gate Theory (Fryer, 2000). A study reported an immediate improvement in pain after applying MET to hamstrings and iliopsoas muscle in patients with pelvic dysfunction (Selkow, 2009). In our study, we have also demonstrated improvement in tenderness, pain and disability after four sessions of MET.

CONCLUSION

MET is an active, simple and safe manual therapy technique. The results of this single group pre-post study are positive. Our study concluded that the technique could be beneficial in alleviating tenderness and pain around PSIS in SIJD patients after four sessions. However, due to the small sample size and the lack of a comparator or a control group, the results should be carefully interpreted.

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