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Effectiveness of Mulligan's Movement with Mobilization and Muscle Energy Technique on Pain, Functional Status, and Depression in Students with Sacro Iliac Joint Dysfunction

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ABSTRACT

OBJECTIVE: The study aims to identify the effectiveness of Mulligan's movement with mobilization and Muscle energy techniques on pain and functional disability in students with Sacro Iliac joint dysfunction.
METHODOLOGY: This randomized control trial was conducted in private paramedical college institutions from august 2019 to July 2020. Group A included 16 subjects, and Group B with 15 subjects. The subjects who fall into the inclusion criteria were included, and subjects who are willing to participate in the study were included in this study. Neurological signs, Radiating pain below the knee, recent surgery & fracture around the hip, and hypermobile joint were excluded. Group A received Mulligan's mobilization and core stability exercise; Group B received muscle energy technique with core stability exercise. Outcome Measures: Pain and functional disability were measured by the modified Oswestry disability index; kinesiophobia was by the Tampa scale.
RESULTS: The level of significance was 0.05. The mean values of the post-test show marked improvement between the groups, with a p-value of 2.69 for functional disability and a p-value of 0.45 for pain. Significant progress was observed in participants who received Mulligan's movement with mobilization. Statistical calculation was done with the help of SPSS version 18.
CONCLUSION: Mulligan mobilization is more effective than the muscle energy technique in managing sacroiliac joint dysfunction.

KEYWORDS: Sacro Iliac joint dysfunction, Mulligan's movement with mobilization, Muscle Energy technique, modified Oswestry Disability Index, Tampa scale for kinesiophobia

INTRODUCTION

Musculoskeletal disorders are common in all groups, with the prevalence in India being 21.3%. Sacroiliac joint dysfunction has been linked to low back pain for many years[1]. 15% to 30% proportion of lower back pain cases are thought to be related to the sacroiliac joint[2]. The mechanics of the spine and pelvis can theoretically be altered by excessive or restricted mobility at the SIJ, leading to pain[3].

Mennell introduced the term "joint dysfunction" for arthrokinematics dysfunction in the absence of pathological alterations in the joints, including capsules and ligaments[5], and linked muscular discomfort and muscle spasms to challenges with typical arthrokinematics mobilization in joint capsules, which restrict joint movement when participants tried to move joints exhibiting symptoms of joint dysfunction[6].

"Sacroiliac dysfunction syndrome" refers to sacroiliac joint abnormalities where a biomechanical issue would be present but no obvious lesion[5]. The pain pattern from the sacroiliac joint is usually below the L5 region (the most specific area is the Fortin area), radiating posteriorly towards the toe, and occasionally mimicking sciatica[3,4]. SIJDF sufferers described pain made worse by bending, sitting, driving, standing, or walking. These actions can also make the pain go away. Although the disease can be unilateral, it often favors the right side when it is bilateral [6].

Mobilization can provide a mechanical effect, such as stretching or rupture of constricted tissues[7], as well as a neurophysiological result to alleviate muscle discomfort and guarding. According to a study, the gate control theory put forth by Melzack and Wall can account for the physiological consequences of joint mobilization[8], which aims to increase the joint range of motion and reduce discomfort. By blocking the pain signal conveyed by thin filaments, a sluggish stimulus in conduction velocity, while proprioceptive neurons of thick filaments are stimulated, the vicious cycle of pain and spasm can be halted[6,7].

Stabilization and management of sacroiliac joint problems are achieved through manual therapy. Research has established the efficacy of Mulligan's manual treatment technique at peripheral joints, known as mobilization with movement (MWM)[8]. The effectiveness of mobilization with actions in managing diseases and joint dysfunction has been shown[7].

The joint is repositioned during mobilization with movement to correct instability, enabling the joint to track normally. Subsequent research to date also reveals that the processes underlying the effect of MWM are based on mechanical dysfunction, necessitating the repair of positional faults[9,10]. A typical conservative method for treating various degenerative disorders of the spine, especially lumbopelvic pain (LPP), is the muscle energy technique (MET)[11].

The muscular energy technique is considered moderate for restricting movement in the spine and extremities[11]. With the muscular energy technique, the patient must actively contract their muscles confidently while the practitioner administers a counterforce that prevents movement. The Muscle energy technique has long been preferred for treating pelvic asymmetry and muscle imbalances in the lumbopelvic region[12]. Unfortunately, fewer studies have investigated the effectiveness of the Muscle energy technique. The study aimed to determine the effect of MWM and Muscle energy techniques on selected variables in students with SI joint dysfunction.

METHODOLOGY

A randomized controlled trial was conducted on college students with sacroiliac joint dysfunction recruited from KMCH institute of paramedical sciences, Coimbatore, Tamil Nadu, India, from august 2019 to July 2020. A simple random technique was used to select the samples. Group A included 16 subjects, and Group B with 15 subjects. Subjects who met the criteria were recruited in this study: A Minimum of 3 out of 6 positive sacroiliac pain provocation tests: Fortin's finger test. Gaenslen's Test, FABER Test, Thigh Trust Test, joint compression test, and distraction test. The age group of 18-26 years, both gender, subjects with clinical or subclinical sacroiliac joint dysfunction, and subjects willing to participate in the study. The subjects with neurological signs, diagnosed with other than SIJD, recent fractures & surgeries around the hip, hypermobile joint, and malignancy, were excluded.

Thirty-one eligible subjects were selected from the population and aligned into two unequal groups. All the participants were obtained with consent forms, and eligible participants were randomly assigned by lottery method into Mulligan's movement with a mobilization group with sixteen subjects and fifteen to the Muscle energy technique group by purposive sampling technique. Subjects were requested not to receive any other treatments or exercises for treatment (4 weeks). The participants in group A were administered Mulligan's movement with mobilization[9,10]. The participants were instructed to lie prone, and the therapist's hands were positioned to perform the techniques.

Position of the therapist for an anterior innominate fault: Standing directly in front of the patient's pelvis on the side of non-affected SIJ. Stabilizing hand: palms down on the sacrum, fingers pointing caudally so that the ulnar border is directly next to the SIJ on the same side. On the side of the affected sacroiliac joint, the fingers of the hand used for mobility are around the anterior part of the ASIS. The mobilizing force is applied to the anterior aspect of the ASIS. **For a posterior innominate fault:** Mobilizing hand: The lowermost hand was used as a moving hand, and its thenar eminence was positioned just medial to the prominent portion of the posterior iliac crest; thus, the fingers pointed outward, the same side's heels were employed to rotate or glide laterally toward the innominate about the sacrum. The second hand's palm can either stabilize the rest of the pelvis or support the mobile hand and aid in the execution of the lateral glide. Three sets of this approach, each with ten repetitions, were administered for 12 sessions on alternate days. The pain is a result of the mobilization being performed in functional positions[10]. The exercise was done while standing and walking for participants who experienced sacroiliac joint pain when walking, which is thought to be caused by an anterior or posterior innominate defect.

Self-Mobilization: At the end of the treatment session, self-mobilization was taught to the patient for anterior innominate: The patient was in all fours position with a towel under the ipsilateral knee and asked to sit on their feet with the hands relatively fixed on the couch, which produces the postero-lateral glide. For posterior innominate, the towel was placed on the contralateral knee and asked to sit on his feet, providing an anteromedial glide.

The participants in group B were given the Muscle energy technique[11,12]. The participants were told to lie prone. The hands are set up to extend while lying passively. Muscle energy technique (MET) exercises include post-isometric relaxation techniques for spinal stabilizers like the erector spine and hamstrings, anterior stabilizers like the Iliopsoas muscle, which stabilizes the spine anteriorly and regulates the lumbar pelvic rhythm, and lateral stabilizers like the quadrates lumborum muscle[11]. It was administered thrice for 12 sessions, each position held for 7–10

seconds. The limitation barrier was then identified, and the subjects were instructed to do a 20–30% isometric contraction, maintain it for 7–10 seconds, and then relax for 2–3 seconds. Instructions for proper breathing were given. Then, three times per session, the limb was moved past the restriction barrier on an exhalation and kept there for 10 to 30 seconds[12,13].
The outcome measures are Pain, Functional status & Depression in students with SI joint dysfunction. Pain and disability were assessed using a modified Oswestry disability index[14,15,] and Depression was assessed using the Tampa scale for kinesiophobia[16]. These were evaluated before and after the intervention. An independent t-test analyzed the obtained data. Both an independent and paired t-test were used to analyze the data.

RESULTS

The results of this study were that Mulligan's movement with mobilization along with core stabilization had a significant effect in improving pain, functional status, and Depression when compared to the muscle energy technique with core stability exercises.

Independent t-test reveals no significant difference in the pre-test mean of Group A and Group B. Regarding the post-test, there was a significant difference in the mean value of Group a & Group B. Group A had more improvement than Group B. **(Table I)**

TABLE I: MEAN DIFFERENCE IN DISABILITY INDEX (GROUP A AND GROUP B)

variable		SD for Mean value		Table 't' value	Level of significance
Modified Oswestry disability index	Pre-test	**Group A**	**Group B**	2.043	P>0.05 insignificant
		24.75±12.26	26.01±11.93		
	Post-test	12.87±5.56	17.06±7.92	2.043	P<0.05 significant

The post-test mean value revealed an improvement in both the groups, but the more significant improvement was observed in group A, which received Mulligan's movement with mobilization, where the values of the modified Oswestry disability index were found to be 12.87% from 24.75%, and group B which showed an improvement level from 26% to 17.06% and the Tampa scale score for kinesiophobia showed a difference of 30.25 from 39.37 in group A and group B showed no percentage difference of 30.26% from 30.25% were found following the treatment. **(Table II)**

TABLE II: MEAN DIFFERENCE IN PAIN (GROUP A AND GROUP B)

Variable		SD for Mean value		Table 't' value	Level of significance
Tampa scale for kinesiophobia	Pre-test	Group A	Group B	2.043	P>0.05 insignificant
		39.37±4.84	38.93±6.94		
	Post test	30.25±3.70	30.26±5.36	2.043	P<0.05 significant

Picture I: Mulligan mobilization for anterior innominate dysfunction in lying

Picture II: Mulligan mobilization for anterior innominate dysfunction in the quadruped position

Picture III: Mulligan mobilization for anterior innominate dysfunction in sit-to-stand position.

Picture IV: Self-mobilization for sacroiliac joint dysfunction.

Picture V: Muscle energy technique for the iliopsoas muscle

Picture VI: Muscle energy technique for hamstring muscle

Picture VII: Muscle energy technique for erector spine muscle

Picture VIII: Muscle energy technique for quadratus lumborum muscle

DISCUSSION

Ishak NA 2017[16] speculate that muscle imbalance or ligament sprain may cause discomfort in the sacroiliac joint and related structures. The pain pattern is where the sacroiliac joint's pattern of discomfort is more frequently felt[18]. The study aimed to determine the effectiveness of MWM, muscle energy technique, and core stability exercises for students with sacroiliac joint dysfunction.

Sacroiliac joint dysfunction and stabilization have often been treated using manual therapy. Research offers a lot of evidence on Mulligan's mobilization[11]. Brian Mulligan claims that when accurate mobilization is used to treat sacroiliac joint pain, the pain usually goes away[18]. However, persistent corrective mobilization restores the pain-free function, and repeated applications result in long-lasting gains[20].

Based on Chaitow's description of the neurophysiology of the muscle energy technique, which shows a subsequent decrease in the tone of the agonist's muscle following isometric contraction, it is possible to extrapolate that the technique reduces pain[11]. Lewis supports this observation that the increased muscle tension of the involved muscles, which produces discomfort and dysfunction, is reduced by restoring the full length[19] of the muscle also because of the Golgi tendon organ responses to overstretching of the muscles by preventing further contraction[20].

Paired t-tests and unpaired t-tests were assigned to find the difference between the group and between the group, respectively, and the recorded values were examined and explained. There was a statistically significant difference within both groups, and also independent- test showed a significant difference within both groups on the selected variables like MODI and TSKP.

Mulligan's movement with mobilization had a significant effect on improving pain, functional status, and depression[21]. In the table, pre and post-test values of the MODI and TSKP showed reduced pain, improved functional status, and Depression following four weeks of treatment[22]. The improvement is significant with $p<0.05$.

LIMITATIONS

The limitations of this study include: short-term follow-up only for four weeks, the limited age difference between 18-26 years, all types of sacroiliac joint dysfunction were taken, the amount of resistance applied by the patient during muscle energy technique was not quantified, and additionally, students were not permitted to change their regular schedules, which would have made their suffering worse while receiving treatment.

CONCLUSION

MET and core stability exercises and Mulligan's mobilization were equally beneficial in treating participants with SIJDF. However, Mulligan's mobilization group found a significant improvement concerning reducing pain intensity, functional ability, and Depression.

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AUTHOR CONTRIBUTIONS

SivakumarS:	Concept, Resources, Data collection and/or Processing analysis, Manuscript writing
Kamalakannam M:	Supervision of research
Kalpana AP:	Analysis, manuscript correction
Prakash J:	Design materials, manuscript corrections
Gowtham R:	Materials, Data collection and/or processing

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