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EFFECT OF LATISSIMUS DORSI AND GLUTEUS MAXIMUS TRAINING ON SACROILIAC JOINT PAIN" RCT (RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Objective: The purpose of this study was to see the effect of strength training of Latissimus Dorsi and Gluteus Maximus over pain and disability caused by mechanical problem at SI joint. **Methodology:** The study included 32 patients who met the eligibility requirements. Before conducting any examinations, participants were required to complete written informed consent forms. Patients with mechanical SI joint pain were divided randomly into two groups. In 'group A' Hot packs with Gluteal stretching was applied while in 'group B' only Strength training was given which included strengthening of both muscles. Patients were divided into two groups according to a computer-generated list. Through the course of the trial, both groups will receive the same conventional therapy. 15 minutes of hot packs will be administered, followed by 5 to 6 sessions of 15-second gluteal stretches. for the A group. Strengthening of both of the aforementioned muscles will be given to Group 2. Three times per week will be set aside for treatment. In both groups, the course of treatment lasted three weeks. **Practical Implication** Low back pain due to SI pain is a very familiar problem in all age group. It pain leads to multiple dysfunctions depending upon severity of pain. And cause of pain it may leads to functional disability. Physical therapy is important in the management of SI joint pain including heat therapy, ultrasound, infrared radiations, and manipulation and in some cases traction. This study was conducted purely in clinical setting of Physiotherapy Department Mayo Hospital, Lahore. The outcome of this study is of great value in treating SI joint back pain which is a great contribution to the health care system of Pakistan. **Results:** Patients in group B showed marked improvement as compared to group A. Comparison Numeric pain rating scale score (NPRS) and Oswestry disability index (ODI) score between both groups has shown that there were significant difference between post treatment scores of nprs with mean 6.18±0.75 to 4.06 ±0.85 and with the P value of 0.00 for all variables of NPRS, showing that group 2 showed marked improvement. Post treatment value of odi shows mean of 50.5±6.4 to47.81± 5.84 with p value less then 0.05. showing improvement in group 2. **Conclusion:** It was concluded from the results of this study that Strength training can improve the patient condition and reduce pain and disability.

KEYWORDS: Latissimus Dorsi, Gluteus Maximus, SI joint.

INTRODUCTION

A diarthrodial synovial joint called the sacroiliac joint is the cause of low back discomfort and transferred pain to the lower extremity.[1] The purpose of this study is to determine the impact on the ipsilateral gluteus muscle and contralateral Latissimus Dorsi.[2] SIJ dysfunction is an underappreciated source of low back or buttock pain.[3] A unique pain generator can be found in about 75% of people with persistent low back pain, despite the fact it is frequently thought of as idiopathic.[2]

Low back and sciatic nerve discomfort were frequently attributed to sacroiliac dysfunction, or SI. SI discomfort's telltale indications and symptoms include lower back and buttock pain that may radiate to the lower hip, groin, or upper thigh.[4]

The muscle at the very edge of the buttocks is called the gluteus maximus. It develops through links to surrounding structures in this region.[2] It begins in the lumbodorsal fascia, the sacrotuberous ligament, the side of the coccyx, the tailbone, the apponeurosis of the erector spine, and the fascia covering the gluteus medius. Additionally, it comes from the side of the coccyx and the bottom portion of the sacrum.[5]

Two important muscles that influence SI joint discomfort are the latissimus dorsi and the gluteus maximus. The gluteus maximus stretches the leg when the hip is flexed to bring it into alignment with the body. At the hip, the gluteus maximus straightens the leg.[6] The latissimus dorsi, a large, horizontal muscle on the back that reaches to the sides and behind the arm, is partially covered by the trapezius, a broad, flat muscle along the midline.[7] One of the largest muscle in the body is latissimus dorsi.[8] This muscle controls shoulder joint medial, flexion from an extended posture, and adduction transverse extension, also known as horizontal abduction. It also works in concert to help the lumbar spine extend and bend laterally.[9]

Because they pass via the scapulothoracic joints and attach directly to the spine, the latissimus dorsi's actions on moving the arms can also effect the scapulae's movements, such as their downward rotation.[10] It has been established that tight latissimus dorsi plays a role in both chronic shoulder and back pain.[11] The lumbodorsal fascia or thoracodorsal fascia is a deep investing membrane that covers the majority of the posterior thorax and abdomen, despite the fact that it is a thin fibrous lamina in the thoracic region.(12)Above, it is continuous with a similar investing layer on the back of the neck.[12]

The SIJ can only support about 2 degrees of mobility in each plane. Loads from the spine are transferred through the joint to the lower extremities.[13] Both muscles distribute loads through the sacroiliac joint, and from the level of L4 to L5, the lumbodorsal fascia is not attached to the spine or ligaments.[14] In order to create a coupling action, these free fibres instead mesh with the contralateral gluteus maximus' superior division and latissimus dorsi.[8] The coordinated motion of the latissimus dorsi and gluteus maximus through the lumbodorsal fascia is an important component of energy transfer in gait.[14]

Activating the gluteus maximus was also demonstrated to increase the compressive force across the SI joint. Clinical studies have demonstrated aberrant gluteus maximus recruitment during weight-bearing activities in people with SI joint dysfunction. Therefore, it is proposed that both aberrant loading of the SI joint and the resulting inadequacies may be responsible for gluteus maximus weakness.[15] Before considering surgery, non-operative treatment with physiotherapy can be performed, although it typically fails. There is still debate despite the descriptions of many surgical procedures and their alleged superior results.[16] Strategies studies suggest physiotherapy exercise and minimally invasive strategies may be superior to other interventions...[17] Physical therapy involved therapeutic exercises performed according to a set plan with the goal of increasing the SIJ's flexibility and bolstering the Latissimus dorsi and Gluteus maximus muscles in the back.[4]

The latissimus dorsi on the opposing side contributed minimally but similarly to the considerable increase in sacroiliac joint stiffness.[18] Since nutation causes the joint surfaces to approach one another as the interosseous ligament winds tighter and the joint may become more secure, we can presume that these muscles had a nutation impact on the gluteal side.[8] Physical therapy is important in the management of SI joint pain including heat therapy, ultrasound, infrared radiations, and manipulation and in some cases traction.

This study provided an opportunity to share my personal experience with community. This study was conducted purely in clinical setting of Physiotherapy Department Mayo Hospital, Lahore. The findings of this study are highly beneficial for treating SI joint back pain, which is a significant addition to Pakistan's healthcare system.

MATERIALS AND METHODS

This research is randomized controlled trial (RCT).This study will be conducted in teaching hospitals of Lahore (KEMU).The duration of study will be 4 months after approval of synopsis. Each

patient will be given treatment for four weeks. Total 32 patients (16 patients in group A and 16 in group B). Sampling technique was lottery method.

Inclusion criteria	Exclusion criteria
•Age 18-45 •both male and females •mechanical pain	•acute back pain •pregnancy •systemic disease •Young patients •Obese patients •Patients are not willing

Data Collection Procedure	The research study will be conducted according to inclusion and exclusion criteria for treatment of SI joint pain. Before beginning the patient's therapy, consent will be obtained via a consent form. Data that will be examined will be subject to both subjective and objective evaluation. Demographic details, such as age and gender, will be included in the data. History of previous illnesses, social standing, marital status, level of education, time from beginning, and the form and location of symptoms. The four separate SIJ provocation tests—test, Gaenslen's compression test, thigh trust, and sacral thrust—were all carried out. **1. The Gaenslen test**: This test for provoking pain twists the joint. The second leg is permitted to hang off the edge of the table while one hip is flexed against the abdomen. In order to induce hip extension and stress the SIJ, pressure should then be applied downward to the leg. **2. The Compression Test:** While the patient is lying on his side, compression is applied to the joint. Uppermost iliac crest is put under pressure in the descending direction. **3. Thigh Thrust Test:** Anteroposterior shear stress is applied to the SI joint during this test. The patient is prone and has one hip 90 degrees flexed. On the same side as the flexed leg, the examiner is standing. The examiner applies either a sharp push or gradually building pressure through the femur's line. The pelvis is stabilized at the sacrum or at the opposite ASIS with the hand of the examiner. **4. Yeoman's test:** By extending the leg and rotating the ilium, this test puts the SIJ under strain. A positive test results in pain across the SIJ's back.[19]
Data Collection Tool	In this study there will be two groups of 36 patients who are diagnosed with Si joint pain due to mechanical pain and this group is given treatment of strength training of Latissimus Dorsi and Gluteus Maims Training to see their effectiveness. • Oswestry disability Scale (ODI) • Numeric pain rating scale (NPRS)
GROUP A: (n=16)	Patients will be asked to perform conventional treatment which includes: • hot pack for 15 minutes • Gluteal stretching with 15 second holds for 4 to 5 times.
GROUP B: (n=16)	In second group along with conventional treatment following exercises are done • Two legged pelvic bridging • Bent knee hip extension • Dead lift • Alternate arm and leg lift in prone lying Patent is asked to perform these exercises with maximum 5 to 7 repetitions with 10 second hold 3 times a day for consecutive 3 sessions in a week and follow up after 3 week.

RESULTS

Table 1 shows the demographic data of the study. In group 1; total patients were 16 having a mean of 35.25±9.69 while group B was 31.88±7.71. the gender distribution were 10 females, 6 males in group 1 while 11 females and 5 males in group 2.

Table 2 depicts pre and post treatment scores of NPRS and ODI scales for pain and disability. Pretreatment an postreatment vales of NPRS was 7.6±0.07 and 6.18±0.0718 for group 1.while group 2.mean score of pair before treatment was 7.4±0.06 and after treatment was mean score 4.0±0.073 with the p-value of 0.00.Pretreatment mean score of ODI was 51.7±6.44 and post treatment mean score 50.5±6.41for group 1 while group 2.mean score of pair before treatment was 52.5±5.6 and post treatment was mean score 4.7.0±5.81.

Table 3 and 4 shows the Post treatment scores of NPRS and ODI. Comparison Numeric pain rating scale score (NPRS) and Oswestry disability index (ODI) score between both groups has shown that there were significant difference between post treatment scores of nprs with mean 6.18±0.75 to 4.06 ±0.85 and with the P value of 0.00 for all variables of NPRS, showing that group 2 showed marked improvement. Post treatment value of odi shows mean of 50.5±6.4 to47.81± 5.84 with p value less then 0.05. showing improvement in group 2. Hence, Null hypothesis is rejected and there is significant difference in in post treatment values of both groups.

Table 1: Descriptive statistical analysis (N=32) between groups.

	Group A (n=16)	Group B (n=16)
Gender	10/6	11/5
Age	35.25±9.69	31.88±7.71
Occupational Status	1.04± 0.33	1.07 ±0.27
Marital Status	0.82 ±0.41	0.85 ±0.42

Table 2: Pre and post treatment scores of Group A & B.

		Group A (n=16)	Group B (n=16)
NPRS Score	Pre-value	7.62± 0.71	7.43 ±0.06
	Post-value	6.18± 0.75	4.06± 0.73
ODI Score	p-value	0.000	0.000
	Pre-value	51.7± 6.44	52.5 ±5.68
	Post-value	50.5± 6.41	47.8± 5.84
	p-value	0.000	0.000

Table 3: Post NPRS values.

	Groups	Mean (sd)	P-value
Post NPRS	group 1	6.18± 0.75	0.000
	group 2	4.06± 0.85	

Table 4: Post ODI values.

	Groups	Mean (sd)	P-value
Post_ODI	group 1	50.5 ±6.41	0.000
	group 2	47.8 ±5.84	

DISCUSSION

The purpose of study was to observe the effect of Latissimus dorsi and Gluteus Maximus strength training on the SI joint pain. In this study 2 groups were made which was group 1 and Group 2. Group 1 was control group in which treatment that was given was Hot pack for 15 minutes and gluteal stretching of 15 sec for 4 to 5 times in each session. In group 2 Two legged pelvic bridging, Bent knee hip extension, Dead lift, Alternate arm and leg lift in prone lying o Patent is asked to perform these exercises with maximum 5 to 7 repetitions with 10 second hold 3 times a day for consecutive 3 sessions in a week and follow up after 3 week.

Research has shown that strength training significantly reduces pain and dysfunction at the SI joint. Pain that results from a mechanical injury of

some kind. Nutation is induced on the gluteal side and countered on the latissimus dorsi side by a force produced by the latissimus dorsi and the opposing gluteus maximus muscles. The latissimus dorsi's coordinated activity, which passes via the lumbodorsal fascia and into the gluteus maximus, is a crucial part of how energy is transferred during stride.

The anatomical reciprocity between the latissimus dorsi on one side and the gluteus maximus on the other has been proven in a study by Abby Vert Money and colleagues from January 2001. 15 healthy people underwent electromyography investigations to show this link through muscular activity. This served as the baseline for the evaluation of 5 symptomatic sacroiliac dysfunction patients.[20]

According to a 2001 study by Manion and colleagues, 132 out of 148 patients (89%) ultimately finished the therapy. Following therapy, all groups' isometric strength in each direction of movement increased (P = 0.0008), with the device group showing the greatest gain. All three active therapy groups experienced significant changes in muscular function following treatment, which appeared to be primarily caused by modifications in the neural activation of the lumbar muscles and psychological modifications involving, for example, motivation or pain tolerance.[21]

Another study depicts clinical evidence of SI joint dysfunction and lumbopelvic discomfort were both evident in the eight participants in this series. Five weeks and ten sessions of five exercises each were given to each patient to strengthen the gluteus maximus. To rule out any potential concomitant diseases, a clinical examination and radiological evaluation were conducted. Strength assessed using hand-held dynamometry, the Oswestry Disability Index, and the visual analogue pain scale were all tested before and after the intervention. When contrasting the pre-intervention involved and uninvolved sides, a substantial (p0.001) gluteus maximus weakening was discovered. Increases in gluteus maximus strength and function, as well as a reduction in pain, were observed after the strengthening exercise programme was completed over 10 visits. Following their release from physical therapy, each individual was able to participate.[22]

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It is clear that the sacroiliac joint directly controls the majority of our musculoskeletal system when you consider that practically every muscle in our body, from the head to the knees, directly attaches to the sacrum or innominate (see image). Given this viewpoint, it should be clear that damage to the sacroiliac ligaments will have a substantial impact on the musculoskeletal system as a whole.

CONCLUSION

By increasing strength of these two muscles pain is reduced, and disability has improved.

LIMITATIONS

Limitations of this study were that all of the participants in this single-centered study came from a single hospital or medical facility. Both the sample size and the amount of time available to perform the investigation were restricted. It received no funding.

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