



“Active Release Technique And Post Isometric Relaxation With Piriformis Syndrome: A Comparative Study”

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ABSTRACT

Background:

Piriformis tightness is a rare problem in our society, affecting people's physical and social functioning and interfering with their daily activities. Due to the lack of symptoms, tightness is difficult to diagnose in the early stages. However, this reduces ROM and has an impact on flexibility. If not diagnosed early, it can lead to Piriformis Syndrome. This study can be used to diagnose Piriformis tightness as well as to release the tightened structures using Active Release Technique and Post Isometric Relaxation.

Objective: To evaluate the effects of post-isometric relaxation and active release therapy on the piriformis syndrome patients' functional impairment, pain intensity, and hip internal rotation.

Methodology:

At the Chhatrapati Shivaji Subharti Hospital, Swami Vivekanand Subharti University, Meerut, a clinical experiment with randomization was carried out. Purposive sampling was used to include 40 patients in the trial, and the sealed envelope approach was used for randomization. The visual analog scale, goniometer, and lower extremity functional scale were used to assess all patients. To collect data, a self-structured a questionnaire was created. For three weeks in a row, there were two sessions every week, with a follow-up one month later. Data were collected at baseline, three weeks later, and one month later. SPSS-20 was used to analyze the data.

Results:

Treatment was given to 40 patients, with a mean age of 41.30 4.99. Treatment was given to 22 women and 18 men. Groups A and B (active release technique and post-isometric relaxation, respectively) showed a significant improvement in all end measures (P 0.05). (VAS, GN, and LEFS). A one-month follow-up indicated no statistically significant differences between the VAS and the goniometer (P>0.05) according to an intragroup analysis. To improve functional impairment, the active release technique was found to be superior to post-isometric relaxation (P 0.05).

Conclusion: ART and PIR are equally effective in reducing pain, hip internal rotation, and functional impairment, according to an intergroup study. According to an intragroup study, ART is superior to PIR for reducing functional impairment in piriformis syndrome.

Keywords: Active Release Technique, Lower Extremity Function Scale, Post Isometric Relaxation, Range of Motion, Visual Analogue Scale.

INTRODUCTION

Groin and sciatic nerve pain are symptoms of the uncommon and sometimes untreated Piriformis syndrome. It might be caused by structural discrepancies between the piriformis muscle and the sciatic nerve, which would cause the sciatic nerve to become irritated by the piriformis muscle's inflammation. This has led to the definition of investigations of the syndrome brought on by anomalies in the piriformis muscle [1]. The piriformis muscle arises from sacral vertebrae two through four's anterior region and attaches to the greater trochanter. Just beneath the inferior border of the piriformis muscle is where the greater sciatic notch of the sciatic nerve typically exits. In 7 to 21% of the study groups, the sciatic nerve (or a division) enters the muscle directly [2,3]. Due to the lack of accurate and extensive diagnostic tests, diagnosis is frequently difficult and reliant on exclusion. Stretching and therapy techniques have long been utilized to treat PS, and in resistant cases, anesthetic and corticosteroid injections into the piriformis muscle belly, origin, sciatic nerve sheath, or muscular sheath are also employed [4,5]. While diagnosing and treating patients who may have piriformis syndrome, it is crucial to take muscle function into account. When the hip is flexed from neutral to extended, the piriformis muscle's motion on the hip joint alters. The hip joint is internally rotated and abducted when the piriformis is flexed, and when it is neutral, it acts as an external rotator of the hip joint. The nuances required to create a treatment plan that is pertinent to the implicated structures while also attending to the patient's physical demands are included in a complete examination [6]. Physical therapy activities designed to enhance hip musculature can be advised for those with piriformis syndrome to reduce repetitive hip movements. Regardless of the research's conclusions, care should be taken when establishing cause and effect from just one patient [7-9]. The typical feature of the syndrome is the inability to sit for extended periods [10]. Piriformis can be differentiated from nonspecific buttock discomfort since it is palpably sensitive up to 92 percent of the time. The belly of the piriformis muscle can be felt posterior to the hip joint, close to the greater sciatic foramen [11]. Surgical and non-surgical therapy options are available for piriformis syndrome. The piriformis muscle is released during surgery, and the sciatic nerve is decompressed as well [12]. Physiotherapy, lifestyle changes, pharmaceutical treatments (non-steroidal anti-inflammatory drugs, muscle relaxants, and neuropathic pain medications) [13], and psychotherapy are all examples of non-surgical care. The use of heat therapy, therapeutic ultrasound, METs, neural mobilization techniques, correction of incorrect posture, strengthening of the hip musculature, and core training along with piriformis muscle stretching are all part of the physiotherapy management of piriformis syndrome. As pain and spasm are the primary concerns for the patient, every effort is made to reduce their suffering by employing the most relaxing and psychosomatically appropriate therapy techniques, like MET, hot packs, and stretching. With the Active Release Technique (ART), a shortened muscle tender spot is targeted with significant pressure, and the patient is then instructed to move their leg into the opposite, lengthened position. Breaking the connections allows the texture, flexibility, and soft tissue function to return [14]. A dynamic method of muscle-based therapy called muscular energy technique (MET) involves a person contracting their muscles against a counterforce supplied by the therapist. Neuro-physiological principles dictate that after a muscle is contracted, it should become relaxed [15]. Traditionally, muscles that support posture are worked with this moderate lengthening approach. These muscles are susceptible to shortening and becoming tight [16]. The study's justification is that piriformis syndrome is frequently misdiagnosed and that there is insufficient research on the benefits of the active release method and post-isometric relaxation. The management of pain, joint mobility, and functional impairment of the lower extremities in piriformis syndrome may be aided by the results of the current study.

METHODOLOGY

From August 2023 to December 2023, the current randomized clinical experiment was carried out at Chhatrapati Shivaji Subharti Hospital, Swami Vivekanand Subharti University, in Meerut. 40 patients were recruited for the study's projected sample size. Patients were randomly divided into two groups with 40 patients in each group using a non-probability purposive sampling strategy. Age between 35 and 55 years, both sexes, persistent hip or gluteal discomfort, palpable sensitivity over the sciatic foramen, and positive results for the FABER and FAIR tests were the inclusion criteria. Malignancies, a history of steroid therapy, painkillers or muscle relaxants, rheumatoid arthritis or osteoarthritis, avascular necrosis of the femoral head, osteoporosis, a femur fracture, and hip joint dislocation were the exclusion criteria [17]. Visual analog scale, goniometer, and lower extremity functional scale were the study's tools and results. With two sessions per week, there were a total of six sessions during the three weeks of treatment. At baseline, three weeks later, and one month later, outcome

measures were assessed. Groups A and B got standard care, such as a moist hot pack placed over the gluteal area for 15 minutes. Three repetitions of a 30-second hold on the piriformis muscle were performed. Three sets of 10 repetitions each were performed while side-lying to develop the hip abductor muscles. The active release approach was used on the patients in the group A. Post-isometric relaxation was administered to Group B patients. The session lasted 40 minutes in total. The data were analyzed with SPSS-20.

RESULTS

A total of 40 patients was split into two groups of 20 each at random. Group A's average age was 41.66 ± 5.55. Group B's average age was 40.93 ± 4.54. In this study, 22 females and 18 males were recruited. 9 men and 11 women altogether made-up group A. Group B contained 8 males and 12 females. Regarding employment, there were 5 unemployed, 13 housewives, 15 office workers, 5 field workers, and 2 athletes. By using the Shapiro-Wilk test to analyze normality, it was discovered that two of the three parameters, the VAS and hip internal rotation ROM, did not have normal distributions ($p < 0.05$). Non-parametric tests were then used, and one parameter, the LEFS, was found to have a normal distribution ($p > 0.05$). Friedman (a non-parametric test) and Repeated Measure Anova (a parametric test) were used for the within-group analysis for normal and non-normal parameters, respectively. Mann Whitney U test (non-parametric) and Independent T-test (parametric) tests were used in the between-group comparison for normal and non-normal parameters, respectively. Intergroup analysis revealed that both ART and PIR were significantly effective on non-normal parameters, VAS, and hip internal rotation range of motion (p -value 0.05), as well as on parametric parameter lower extremity functional scale (p -value 0.05). When compared within groups, ART and PIR failed to make a difference for values that were not considered normal. While ART provided significant results in the parametric parameter LEFS (p -value 0.05), VAS and hip internal rotation (p -value > 0.05), did not, ART did.

Table 1: Demographic Data

Variable		Group A	Group B
Age (years) Mean±SD		41.66±5.55	40.93±4.54
Gender	Male	9	8
	Female	11	12

Table 2: Mann Whitney U Test Non-Parametric Intra Group Analysis for VAS and Hip Internal Rotation ROM

Variables	Mean Rank		Median (IQR)	P-Value
	Group A	Group B		
Pain at baseline	15.93	15.07	7 (1)	0.766
Pain after 3 weeks	16.90	14.10	3 (1)	0.347
Pain after one month follow up	15	16	2 (1)	0.695
Hip Internal Rotation at baseline	14.87	16.13	31(2)	0.689
Hip Internal Rotation after 3 weeks	15.7	15.3	35(1)	0.900
Hip Internal Rotation after one month follow up	13.4	17.6	38(2)	0.179

Table 3: Independent t Test Parametric-Intra Group Analysis for LEFS

Variables	Groups	Mean± SD	P- Value
LEFS at baseline	A	34.4±3.64	.047
	B	37.46±4.47	
LEFS after 3 weeks	A	59.86±3.7	.012
	B	63.4±3.48	
LEFS after one month follow up	A	65.86±2.16	0.049
	B	67.4±1.91	

DISCUSSION

This study examined the effects of ART and PIR in patients with piriformis syndrome, a condition for which there is currently little research. Following therapy, patients in both groups demonstrated appreciable improvements in VAS, hip internal rotation range of motion and LEFS. This is consistent with other studies' findings that patients with musculoskeletal problems such as piriformis syndrome benefit from ART and PIR in terms of reduced pain intensity, decreased functional impairment, and enhanced range of motion [15,18,19]. However, group A, where ART was used, had better outcomes in terms of reducing functional impairment. In the current study, housewives and office employees had higher rates of piriformis syndrome. This could occur as a result of extended sitting, cross-legged postures, or bad posture that puts excessive strain on the piriformis and other deep gluteal structures. In 42 healthy patients with tight piriformis, Junaid Mujawar et al. (2019) examined the immediate benefits of neuromuscular treatment, ART, and stretching. The age range was between 18 and 25. Hip internal rotation, the Oswestry disability index, and the VAS for pain intensity were used as outcome measures for piriformis tightness. Stretching was found to be less beneficial than ART and neuromuscular therapy [18]. The effects of active release therapy for persistent low back pain on the gluteus medius in 12 individuals were examined by Sajin Tak et al in 2013. Two sessions of ART were administered for three weeks in a row on trigger sites in the gluteus medius. Pain and the pressure pain threshold in the gluteus medius were outcome measurements. It was determined that ART reduced lower back pain effectively [19]. Comparable improvements in pain and functional impairment were seen in the current trial. Significant reductions in pain, joint ROM, and functional impairment were reported by every patient. This may be because, during ART, the therapist directly applies pressure to the taut band of the piriformis, which is extended more effectively. This demonstrates the potential of ART as a successful therapy for piriformis syndrome. In their 2018 study, Nambi and Dusad compared reciprocal inhibition and post-isometric relaxation. The 64 subjects were divided into 3 groups at random. There were 12 sessions throughout 2 weeks. Pain intensity, hip range of motion, and functional impairment were outcome indicators that were assessed at baseline and two weeks later. They suggested that PIR-assisted hip muscle strengthening aids in the correction of abnormal movement patterns, minimizing stress on the piriformis muscle. This relieves pressure on the sciatic nerve. It was determined that post-isometric relaxation is more successful than reciprocal inhibition in treating piriformis syndrome and more research was suggested for chronic piriformis syndrome [17]. According to the present research, PIR may lessen sciatic nerve tension by loosening up the piriformis. The muscle relaxes reflexively following an isometric contraction period, which causes a reduction in tension. The current study found that this significantly increases the hip's range of motion and enhances hip internal rotation.

CONCLUSION

Art and PIR are equally effective in reducing pain, hip internal rotation, and functional impairment, according to an intergroup analysis. According to an intragroup analysis, ART is superior to PIR for reducing functional impairment in piriformis syndrome. The study's limitations include the inability to generalize its findings because of the smaller sample size. Future research is advised to examine the long-term impacts of ART on a broader scale to generalize the findings, data from various clinical settings should be gathered, and patients from various

age groups should be examined to assess the effects of ART across all age groups. Further research should be done on patients with piriformis syndrome using the same treatment as well as cutting-edge technology and radiological factors.

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