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ORIGINAL ARTICLE

Efficacy of Hip Abductors Strengthening as Compared to Piriformis Muscle Stretching in Improving Lower Extremity Function in Patients with Piriformis Syndrome

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ABSTRACT

Objective: The study's goal was to determine the effects of hip abductors strengthening and piriformis stretching on pain, hip abductors strength, and lower extremity functional status in piriformis syndrome patients.

Methodology: A total of 60 patients were diagnosed with piriformis syndrome and referred to the Physiotherapy department from the NILD Assessment Clinic. Then, using simple random sampling, 60 patients were divided into two groups: Group-A (Hip abductor and Sciatic nerve mobilisation) and Group-B (no hip abductor and sciatic nerve mobilisation) (Sciatic nerve mobilisation and piriformis stretching). Each subject's demographic data was collected prior to the intervention. Data on pain severity, muscle strength (hip extensor and abductor), and lower extremity functional scale score were collected before and after treatment. Both groups continued to take their medications according to the evaluation clinic's recommendations.

Results: Patient's average age was 57.18 ± 2.64 years. Out of 60 patients 19 belongs to age 35-45 year, 13 belongs to 45-55 year and 28 belongs to age group of 55-65 year. This table explains that mean difference of NPRS and Hip Abductor strength between two groups showed p-value 0.082 and 0.100 respectively statistically non-significant result, whereas, Hip Abductor strength and LEFS showed p-value 0.001 statistically significant difference between two groups.

Conclusion: According to the findings piriformis syndrome can be treated without the use of stretching, electrophysical agents, or soft tissue mobilization. Considering that piriformis insertion is on greater trochanter. The excessive hip adduction and internal rotation shown during functional movement testing were exerting tension on this muscle, resulting in sciatic nerve compression. However only Group A improved in terms of hip abductor strength. Group A demonstrated considerable improvement in strength of hip abductor and lower extremity functional scale when compared to Group B.

Keywords: Piriformis syndrome, Sciatica,

INTRODUCTION

Piriformis syndrome is a rare and most often undiagnosed condition of groin and sciatic nerve pain. It could be triggered by anatomical differences between the piriformis muscle and the sciatic nerve, leading to sciatic nerve irritation by the inflammation of piriformis muscle. As such, studies of the syndrome caused by piriformis muscle abnormalities have been defined.[1]

The piriformis muscle emerges from of the anterior part of sacral vertebrae two through four and attaches on greater trochanter. The sciatic nerve commonly leaves greater sciatic notch just under the piriformis muscle's inferior border. The sciatic nerve (or a division) directly penetrates the muscle in between 7 to 21 percent of studied groups.[2,3]

Diagnosis is very often complicated, as it is based on exclusion due to the scarcity of reliable and comprehensive diagnostic testing. Stretching and therapeutic modalities have traditionally been used to treat PS, with refractory patients also undergoing anesthetic and corticosteroid injections into the piriformis muscle belly, origin, sciatic nerve sheath or muscle sheath.[4,5]

Function of muscle is a vital factor to acknowledge when evaluating and treating patients with possible piriformis syndrome. The piriformis muscle's movement on the hip joint changes as the hip goes from neutral position to flexed. When flexed, it internally rotates and abducts the hip joint moreover, when neutral, the piriformis works as a hip external rotator. A thorough assessment includes the specifics necessary to formulate a plan of treatment that is relevant to the involved structures but also addressing the physical needs of the patients. [6]

For those with piriformis syndrome, physical therapy exercises focused on improving hip musculature to minimize repeated hip movements can be recommended. Regardless of the findings presented in the studies, caution should be exercised when determining cause and effect based on a single patient.[7-9]

Objective: The study's goal was to determine the effects of hip abductors strengthening and piriformis stretching on pain, hip abductors strength, and lower extremity functional status in piriformis syndrome patients.

MATERIALS AND METHODS

A comparative study was conducted at university of medical and dental college. After approval from the ethical committee, the study duration was six month.

Inclusion criteria: 60 patients were included in this study. Patients between the ages of 35 and 65 with piriformis syndrome, with a positive FAIR (H-reflex with hip flexion, adduction, and internal rotation) and Lasegue test, and with grade 1 to 3 tenderness at the piriformis muscle-sciatic nerve junction.

Exclusion criteria: Subjects were excluded if they had any disc and facet joint pathology, congenital or acquired spinal column abnormalities, a history of spinal trauma, joint dysfunction or congenital defects, a pre-diagnosed musculoskeletal abnormality in the lumbar spine, shoulder, or sacroiliac joint, discomfort due to any chronic inflammatory disorder, rheumatologic disorders, pregnancy, or malignancy. Neurological disorders include CVA and Parkinson's disease.

Procedure: A total of 60 patients were diagnosed with piriformis syndrome and referred to the Physiotherapy department from the NILD Assessment Clinic. Then, using simple random sampling, 60 patients were divided into two groups: Group-A (Hip abductor and Sciatic nerve mobilisation) and Group-B (no hip abductor and sciatic nerve mobilisation) (Sciatic nerve mobilisation and piriformis stretching). Before the intervention, each subject's demographic data was collected. Pre-intervention and post-treatment data for pain severity, muscle strength (hip extensor and abductor), and lower extremity functional scale score were collected. Both groups continued to take their medications as recommended by the evaluation clinic. The severity of pain was measured using a numeric pain rating scale. The subjects were instructed to "indicate

the strength of present, best, and worst pain" on a scale of 0 (no pain) to 10 (extreme pain) (worst pain). The measurements were taken before the intervention and after the intervention, which lasted three weeks. Using a Jamar hydraulic hand-held dynamometer, the isometric muscle strength of the involved hip abductor and extensor muscles was measured (JHHD). Subjects were tested for hip abductor strength while lying on their side on the couch, with the non-tested limb in flexion at the hip and knee for pelvis/trunk stabilisation. The test limb was held in a position of zero hip abduction and hip and knee flexion. The unit was positioned over the lateral femoral condyle. For hip extensor strength testing, subjects were tested while lying prone on the couch with their knees flexed to zero degrees.[10] The device was positioned against the posterior thigh's distal end. The patients were instructed to perform a maximal voluntary isometric contraction (MVIC) against a dynamometer, which measured the applied force in kilogrammes. To reduce the possibility of a learning effect, the individual test was administered three times; the best value was determined by averaging three consecutive measurements.[11] With respect to leg and posterior thigh symptoms, the Lower Extremity Functional Scale was used to measure lower extremity functional status. Patients were informed of all LEFS objects and asked to mark them on the questionnaire on the day of the assessment and again at the conclusion of the therapy session.

Statistical Analysis: SPSS-version 22 was used for statistical analysis. A paired t test was used to examine the intragroup variables for the NPRS, hip abductor and extensor power, and lower extremity functional scale (LEFS). An independent t test with mean difference was used to analyse the intergroup variables for NPRS, hip abductor and extensor power, and LEFS. A p-value of less than 0.05 was used to determine significance.

RESULTS

Out of 60 patients 43(72%) were female and 17(28%) were male (fig:-1). Patient's average age was 57.18 ± 2.64 years. Out of 60 patients 19 belongs to age 35-45 year, 13 belongs to 45-55 year and 28 belongs to age group of 55-65 year (fig:-2). In both the pretreatment and post treatment groups, there was a significant difference in pain intensity with a p-value of 0.001. (table-1). Intragroup analysis of hip abductor strength revealed that hip abductor strength increased in Group-A from 8.860.39 in pretreatment to 9.26 1.52 in post treatment with p-value 0.000 and decreased minimally in Group-B from 9.26 1.52 in pretreatment to 9.391.65 in post treatment (p>0.05). The difference in Group A is statistically significant, whereas it is insignificant in Group B. (Table-2). This table explains that the mean difference in NPRS and Hip Abductor strength between two groups was statistically non-significant at p-values 0.082 and 0.100, respectively, whereas the difference in Hip Abductor strength and LEFS was statistically significant at p-value 0.001 (Table-3).

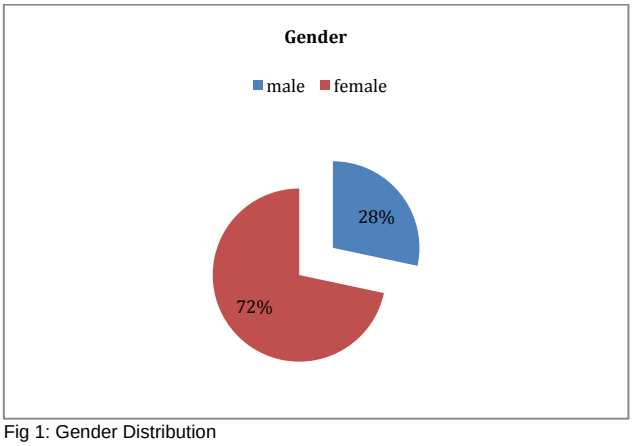

Fig 1: Gender Distribution

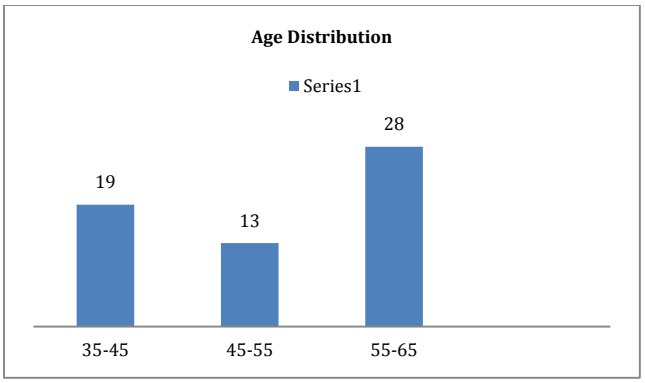

Fig 2: Age Distribution

Table 1: Group wise comparison of Pain Intensity

		Groups		
Paire-1		A(N=30)	B(N=30)	P-Value
	Pre	9.54±0.42	8.12±0.39	.001
	post	2.73± 1.31	2.95±1.20	.001

Table 2: Group wise comparison of Hip Abductor Strength

		Groups		
Paire-1		A(N=30)	B(N=30)	P-Value
	Pre(kg)	8.86±0.39	9.11±0.47	.000
	Post(kg)	9.26± 1.52	9.39±1.65	.110

Table 3: Group wise comparison of NPRS,LEFS, and Hip Abductor

	Groups		
Treatments	A(N=30)	B(N=30)	P-Value
NPRS	3.89±1.21	3.11±1.30	.082
LEFS	20.67±3.49	12.91±2.49	.001
Hip Abductor	2.87±1.10	1.53±0.78	.001

DISCUSSION

The aim of the study was to find out the effects of hip abductors strengthening and piriformis stretching on pain, hip abductors strength and lower extremity functional status in patients of piriformis syndrome. The result of this study showed significantly reduction in pain intensity in both hip abductors strengthening and piriformis stretching group while more significant improvement had been seen LEFS at post treatment.

A study conducted that patient with piriformis syndrome who responded positively to an intervention program focusing on strengthening hip muscles and correcting incorrect lower limb movement patterns. Clinically significant improvements were reported in the absence of routinely utilized treatment techniques for piriformis syndrome (stretching techniques, soft tissue techniques, injections). As a result, for individuals with piriformis syndrome, physical therapy procedures concentrating on strengthening hip muscle to decrease excessive hip movement may be needed.[12-13] In current study, result showed that group A which received the treatment of hip abductor strengthening showed significant results as compared to group B which received piriformis stretching.[14]

A study was conducted to evaluate the performance of athlete concluded that treatment procedures that enhance strength, flexibility, and physical function are thought to be significant in restoring the athlete's ability to compete pain-free.[15-16] In our study treatment group that received strength training of hip abductors showed significant results statistically. Strength training decreases the pain intensity as well as enhances the functional status of patients. [17]

Surprisingly, numerous publications have identified hip abductor weakness as a condition related with piriformis syndrome. However, only two of these publications included hip abduction strengthening as part of the therapy program, with one of the two authors noting that hip abduction exercises "seemed to speed recovery." As a result, a treatment program that addresses

hip strength and movement reeducation is recommended.[18-19] This study results proved this hypothesis of previous studies that hip abductors strengthening increases showed the improvement in functional status and reduction in pain. [20]

CONCLUSION

This study found that both groups improved significantly in terms of pain and functional status. When compared to neural mobilization and piriformis stretching alone and hip abductor strengthening had a significant effect on improving hip abductor strength and lower extremity function. According to the findings of this study piriformis syndrome can be treated without the use of stretching, electrophysical agents, or soft tissue mobilization. Considering that piriformis insertion is on greater trochanter, we theorized that the excessive hip adduction and internal rotation shown during functional movement testing were exerting tension on this muscle, resulting in sciatic nerve compression. However only Group A improved in terms of hip abductor strength. In the between-groups statistical analysis, Group A demonstrated considerable improvement in strength of hip abductor and lower extremity functional scale when compared to Group B.

Limitation: This research showed effects after the second session of follow-up. Because there was no long-

term follow-up examination, it is impossible to evaluate if the effects were temporary. Further

studies are needed to determine the long-term benefits of the hip strengthening maneuver.

Recommendation: Further hip abductor strengthening should be applied in combination of hip extensor

strengthening to evaluate the effectiveness of strengthening techniques as compared to stretching

techniques in improving lower extremity function in patients with piriformis syndrome.

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