Outcome of Specific Piriformis Stretching Technique in Females with Piriformis Syndrome

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Conflict of Interest: None declared

This article has been peer reviewed.

Article Submitted on: 26th March 2017

Article Accepted on: 16th September 2017

Funding Sources: None declared

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Cite this Article: Saeed Q, Malik AN, Ghulam S. Outcome of specific piriformis stretching technique in females with piriformis syndrome. J Pioneer Med Sci 2017; 7(4): 55-58

ABSTRACT

BACKGROUND: Pain and functional limitation affect the quality of life in piriformis syndrome. Stretching of piriformis is essential in the treatment protocols in physiotherapy, however, which sequence of stretching provides optimal improvement is only determined by trial and error. The purpose of this study was to compare the effects of specific stretching technique in terms of functional outcome in female with piriformis syndrome and to determine the normative length of piriformis at different reference points in females.

METHODS: This study was a randomized controlled trial that was conducted in the Physiotherapy Department of the Armed Forces Institute of Rehabilitation Medicine, Rawalpindi, Pakistan between July to December, 2015. This study enrolled 30 patients with piriformis syndrome at outpatient department between the ages of 20 and 50 years. These patients were randomly assigned into two groups. In one group, external rotator sequence of self-stretching (ERS) was practiced while in the second group, adductor sequence of passive stretching (APS) was performed. Each group was treated for two weeks. Pre and post intervention, the assessment was made on Numerical Pain Rating Scale (NPRS), Functional Performance of Lower Extremity Scale (FPLES) and by measured length at three reference positions. Independent T-test was used for statistical analysis.

RESULTS: Both groups showed improvement in outcome in term of a decrease in pain score on NRPS, FPLES and measured reference lengths at all three positions (p-value < 0.05). Adductor pattern of stretching was as effective as external rotator pattern of stretching (p-value> 0.05) when results of pain score and measured reference length at three different positions were compared. However, on the FPLES, external rotator stretching technique was more effective than adductor stretching technique (p value < 0.05).

CONCLUSION: The two studied sequence of piriformis stretching exercises have the same effect on outcomes in terms of clinically measured referenced length and decrease in pain score. Future studies will highlight which subgroups patients are more likely to get greater benefit for a given technique.

Keywords: Flexion; Adduction and Internal Rotation test; Piriformis syndrome; Stretching Techniques

INTRODUCTION

Piriformis syndrome is defined as neuritis of sciatic nerve caused by an injured or irritated piriformis muscle [1, 2]. Early diagnosis and appropriate conservative management yields improvement in days to weeks [3]. Treatment includes the use of Non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, hot/cold fermentation, stretching of the piriformis muscle and strengthening of abductors and/or lateral rotators and manual techniques [3, 4]. Piriformis is an external rotator of the hip during extension, abductor of the hip at 60 degrees and internal rotator during 90 degrees of flexion at hip joint [4]. Ignoring hip adduction, the greatest

stretch in the upper fibers of piriformis occurs with 90 degrees hip flexion and 50 degrees external rotation, the greatest stretch in the lower fibers occurs with 90 degrees of hip flexion, the least stretch in both upper and lower fibers occur with 90 degrees of flexion and 40 degrees internal rotation of the hip [5].

Number Rating Pain Scale (NRPS) and Functional Performance of Lower Extremity Scale (FPLES) are used for assessment/evaluation of pain and functional assessment in patients with piriformis syndrome. FPLES is a valid and reliable self-assessment functional tool [1, 5, 6]. We chose these two scales to determine the outcome and pain response in our study. The objectives of the study were to compare the effectiveness of two piriformis stretching technique in terms of functional outcome in female with piriformis syndrome and to determine the normative length of piriformis in different reference point in females.

METHODS

The first part of this study was a cross sectional pilot study and 20 healthy participants were recruited through purposive sampling techniques. Length from posterior superior iliac spine to greater trochanter was measured with measuring tape in flexion, adduction and internal rotation (FAIR) position at an angle of 0, 60 and 90 degrees of hip flexion. The second part of this study was a randomized control trial. Thirty participants with piriformis syndrome were randomly assigned to two groups of equal sizes. The study was conducted at the Armed Forces Institute of Rehabilitation Medicine from 1st June, 2015 to 31st December, 2015. Piriformis syndrome was diagnosed by two physiotherapists, in females between the ages of 20 and 50 years. Patients were diagnosed with piriformis syndrome if they had pain over three points (greater sciatic notch, piriformis muscle and greater trochanter), positive Lasegue sign and FAIR test and one positive test out of the following three tests i.e. Pace, Beatty or Freiberg. Any structural anomaly, pathology at disc or facet joint, orthopedic disorders, mental limitations or where the etiology was thought to be infectious causes were excluded.

Treatment protocol: Ultrasonotherapy of 2 W/cm² for 3 minutes over trigger point and hydrocollateral pack was applied for 10 minutes, followed by stretching exercises. The external rotator sequence of self-stretching (ERS) group performed self stretching in sitting position followed the sequence of hip flexion, external rotation and adduction followed by more stretch into external rotation. The stretch position was maintained for 30 seconds/10 repetitions /set were performed twice daily. The adductor sequence of passive stretching (APS) group was treated with passive stretching applied in lying position by physiotherapist following sequence of hip flexion, then adduction and external rotation with application of more stretch into adduction, holding time of 30 seconds/ 10 repetitions/ once daily. Home plan of bilateral bridging, side leg raise with hip and knee flexion to 45 degrees and feet together (without resistance for first 5 days and with resistance of grey theraband for last 5 sessions) was taught to both groups along with avoidance of sacral sitting, changing of posture every 30 minutes, avoidance of lifting heavy objects, avoidance of high heels and flat shoes and recommendation of soles of 1-1.5 inches.

The written informed consent was taken and the study was approved by the ethical committee of Riphah International University. We used NRPS and FPLES for assessing functional outcomes. The length was measured in millimeters by measuring tape in the FAIR position at 0, 60 and 90 degrees of hip flexion. Two readings were recorded against each scale, one at baseline i.e. before treatment and the other one on completion of 10 sessions. The SPSS 19 was used for statistical analysis and the independent T test was used to compare the means for inferential analysis.

RESULTS

Participants were similar in characteristics between two groups. There is no difference between two groups (p value >0.05) after treatment with regards to pain and reference lengths. However, there was a significant difference between group scores on FPLES after treatment (Table 1).

DISCUSSION

We concluded this study to examine the effectiveness of two sequences of piriformis stretching in terms of pain and functional outcomes in piriformis syndrome in females. Pain remarkably reduced in both groups after the interventions of two weeks but there was no significant difference in terms of pain between

Table 1: Study population characteristics before after interventions

	Before treatment			After treatment		
	ERS group	APS group	p-value	ERS group	APS group	p-value
NPRS	6.13±0.7	5.13±1.1	0.2	2.20±1.2	1.40±1.6	0.13
FPLES	8.6±1.8	7.53±1.9	0.1	15.47±2.0	13.8±1.7	0.02
Length at 0°	144.6±56.4	142.53±47	0.9	145.4±53.3	143.4±46.7	0.92
Length at 60°	149.27±56.2	146.80±46.4	0.9	151.93±55.8	148.47±46.4	0.85
Length at 90°	160.80±66.8	154.73±43.4	0.8	165.47±70.3	156.93±42.9	0.67

NPRS= Numerical Pain Rating scale, FPLES=Functional Performance Lower Extremity scale, ERS= External rotator self-stretching group, APS= Adductor passive stretching.
Referenced measured lengths from posterior superior iliac spine to greater trochanter

ERS and APS group. However, external rotator sequence of self-stretching showed more improvement on FPLES when compared to adductor sequence of passive stretching.

As piriformis is a deep muscle and its length cannot be measured directly, therefore, after literature review, two reference points (posterior superior iliac spine and greater trochanter) were chosen to clinically evaluate and document reference length in three different positions (anatomically standing position, FAIR position at 60 degrees and FAIR position at 90 degrees). All reviewed articles agreed upon distal referenced point i.e. greater trochanter [7-9]. Clinically length measurement of viable tissues of participants in our prior pilot study confirmed the increase of piriformis length with an increase in hip flexion supporting the evidence established on non-viable tissues of cadaver [8].

Andrew and Wells studied the change in piriformis length during stretching with the help of CT scan. Adopting adductor pattern of stretching (90 degrees hip flexion, followed by adduction and then external rotation) produced a greater increase in length when compared to external rotator stretching pattern (90 degrees hip flexion, followed by external rotation and then adduction) [10]. This increase in length was noted at the time of stretch; there was lack of stretching protocol (frequency, intensity, duration) so that this informative empirical data could not be used for the optimal outcome on functional status.

Fisherman designated overuse and trauma as most common causes of piriformis syndrome and argued that in most cases the syndrome is bilateral. In his study, bilateral fatty triangular sciatic foramen was effaced in athletes involved in high impact activities which were confirmed by MRI [3]. In contrast we found that all patients showed positive diagnostic tests unilaterally. Stretching was also advised and conducted unilaterally but strengthening was performed bilaterally. Following the protocol, patients showed remarkable improvement in functional outcomes. In contrast to above study, none of our participants was an athlete or engaged in a regular exercise program.

Tonley JC et. al, Fishman and Verbruggen M have described the adoption of FAIR position not only for the diagnosis of piriformis syndrome but also as treatment [1, 3, 11].This notion supports and explains the reason of reported pain relief with the progression of sessions in both groups.

Our study has certain strength and weakness. Detailed assessment and management plan of the study was clinically feasible, cost effective and patient oriented. Patient's follow up after completion of treatment was lacking. Confirmation of performance of exercises given to the patient as the home plan was solely on subjective feedback. No radiological test was performed to affirm/reject clinical diagnosis or for confirmation of the results obtained during clinical length assessment.

CONCLUSION

In conclusion we found that the two sequences of piriformis stretching exercise have the same effect on outcome in terms of clinically measured referenced length and decrease in pain score. However, ERS showed more improvement on FPLES when compared to APS. Future studies with larger sample size are needed to identify subpopulations of patients who may benefit from one intervention more than the other.

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