Original Article

Immediate Effectiveness Of PNF Hold Relax Exercise And Quads Strengthening On Pain, ROM And Quality Of Life In Piriformis Syndrome: A Case Report

Nida Khan ,[1] Iqra Asad ,[2] Maryam ,[3] Dur e Shahwar ,[4] Ansa Areej ,[5] Azanish Butt [6]

Abstract

Introduction: Piriformis syndrome is a neuromuscular disorder in which there is entrapment of sciatic nerve under the piriformis muscle. The current cases study explained the effectiveness of stretching exercises along with quads strengthening exercises in treatment of a patient with piriformis syndrome (PS).

Case Presentation: The 35-years old female patient with the episodes of previous back pain from last 1 year presented to the physiotherapy department of District Head Quarter Hospital Jhelum for physiotherapy treatment due to persistent pain in the lower lumbar and buttock areas radiating towards the left leg. The treatment of the patient included the PNF hold relax hamstring and quads long arc exercise. Outcome measures include NPRS for pain intensity, ROM, and Lower extremity functional scale (LEFS) was used to measure lower limb function. Patient was assessed immediately after treatment.

Results: The post intervention measures indicated improvement in all symptoms i-e; NPRS = 2, SLR = 95°, hip abduction= 40° and hip internal rotation= 36°, LEFS=93.8%.

Conclusion: The PNF stretching exercise of the hamstring along with quads strengthening exercise resulted in immediate improvement in pain, ROM and lower limb function in patient having piriformis syndrome.

Keywords: Piriformis syndrome, PNF Hold Relax, Quads Strengthening

1. Introduction

Piriformis syndrome (PS) is a neuromuscular disorder caused by the entrapment of sciatic nerve by the shortened piriformis muscle while exiting through the greater sciatic foramen and characterized by pain, tenderness and numbness radiating down the back of ipsilateral lower limb. Piriformis syndrome is one of the most common diagnosis in the absence of discogenic or spinal pathology. (1) The shortened or tight piriformis muscle exerts pressure on the underlying sciatic nerve resulting in the nerve irritation and symptoms along the course of the nerve in the posterior part of the leg . (2) PS is common in females due to wider Q angle, with female to male ratio of 6:1. Overall prevalence is 6% in the general population. PS involves 6-8% of sciatic pain and 5-6% of chronic low back cases and is common in fourth and fifth decades of the life span . (1) There are two types of PS; Primary PS and secondary PS. The primary PS is results from anatomical variations in the form of split sciatic nerve or piriformis muscle. The secondary PS is caused by other factors like overuse, compression (eg. wallet neuritis), macrotrauma and local ischemia . (3) In a systematic review, Hopayian and Danielyan gave the the criteria for the diagnosis of PS i-e, gluteal pain, tenderness near greater sciatic notch, increase pain while sitting, and pain caused by any maneuver that aggravates tension in the piriformis muscle and limits straight leg raising. (4) Diagnostic tests for PS include the FAIR test, Freiberg's test, Lasegue's test, and the Pace and Beatty maneuvers, all of which may show positive signs for PS[17]. MRI and CT scans may help to differentiate between muscular spasm and spinal pathology including vertebral and disc problems. (3)

Physiotherapist DHQ Hospital, Jhelum ,[1] Physiotherapist, Shifa Tameer-e-Millat University, Islamabad, [2],[6] Physiotherapist, Mega Medical Complex, Rawalpindi [3,] Physiotherapist, Ibadat International University, Islamabad [4,5]

Correspondence: Nida Khan, Physiotherapist DHQ Hospital Jhelum **Email:** knida816@gmail.com

There are many treatment options identified in the management of piriformis syndrome including physical therapy, medications, injections, and surgical decompression. [4] The physiotherapy management includes electrotherapeutic modalities like heat application, ultrasound, therapeutic exercises including stretching exercises, strengthening exercises of hip muscles, muscle energy techniques etc. Techniques such as proprioceptive neuromuscular facilitation (PNF) are particularly good at reducing pain symptoms and restoring a specific muscle's range of motion, enhancing flexibility and muscle strength. [5] It has been identified that the weakness of hip muscles and quads results in spasm of piriformis muscle and compromises pelvic stability. The strengthening of quads along with gluteal muscles decrease the load and enhances the pelvic stability which in turn releases the pressure on the sciatic nerve. The strengthening of hip muscles like adductors and extensors are found to have positive effects in the management of piriformis syndrome when combined with stretching exercises. [6] but there is lack of evidence regarding the effects of quads strengthening exercise along with PNF hold relax of hamstring in the management of PS. It has been found that active contraction of quads creates a 'neuromuscular reset', increasing the relaxation of hamstring and helps in improving overall pain and function of lower limb. [7] The current case study aims to describe the immediate effectiveness of quads strengthening along with PNF hold relax of hamstring in piriformis syndrome.

2. Materials & Methods

The study was conducted at DHQ hospital Jhelum. The aim of the study was explained to the participant for his/her agreement to take part in the study. The whole procedure was explained and informed consent was signed by the patient. The treatment of the patient included the PNF hold relax hamstring and quads strengthening using long arc exercise. Outcome measures include NPRS for pain intensity, ROM, and Lower extremity functional scale was used to measure lower limb function. Patient was assessed immediately after treatment.

CASE

The 35-year old female patient presented to the physiotherapy department of DHQ Hospital Jhelum due to persistent pain in the lower lumbar and buttock areas radiating towards left leg. History revealed intermittent episodes of back pain from the last 1 year and the patient had continuous pain while performing basic ADLs and relieved on doing rest and taking painkillers. Pain radiated to the left posterior and lateral aspect of the hip and lower leg. The aggravating factors were prolonged sitting, walking, lying down and performing basic household chores. Pain usually aggravated at night.

The medical history of the patient was non-contributory. The initial assessment showed pain and tenderness over the sacroiliac joint, greater sciatic notch, left piriformis muscle, decrease in hip joint active and passive ROM.

The clinical examination revealed FAIR (Flexion, adduction, internal rotation) test was positive, indicating irritation of the piriformis muscle. The patient was diagnosed with piriformis syndrome. The diagnosis was based on the positive special test (FAIR), characteristic signs and symptoms, and detailed assessment. The Functional status and subjective pain was evaluated using the NPRS and lower extremity functional scale (LEFS), and ROM was measured using Goniometer. The Pain intensity using the Numeric Pain Rating Scale (NPRS) was 6/10 and the functional status indicated by lower extremity functional score was 16/80=20%. An Active straight leg raise on the left leg produced pain in the posterior aspect of the leg at approximately 30° of hip flexion. Goniometer assessment further demonstrated reduced ranges

accompanied by significant pain during movement i.e: left hip flexion= 30°, hip abduction 20°and hip internal rotation 17°.

The patient was fully informed about the treatment steps, and informed consent was obtained before starting the treatment. The initial treatment session began with application of moist heating pack to the lumbosacral and gluteal region for 10 minutes. Following heat application, the patient was positioned in supine position and the hold-relax technique for hamstring was performed with 10 repetitions to improve hams flexibility and reduce tightness. After that the quads long arc exercise is performed. The patient was seated on the quadriceps bench with 1kg of resistance. Each repetition was held for 10 seconds with a total of 10 repetitions. Subsequently, a piriformis stretch was administered. The left lower limb was positioned to achieve a targeted stretch over the piriformis muscle with 10 repetitions and each stretch was maintained for 10 seconds

After the session, the patient reported immediate pain relief and improved hip flexion to 95°, hip abduction to 40° and hip internal rotation to 36°. Pain level decreased to 2/10 (NPRS) 75/80=93.8% (LEFS) immediately after session along with that demonstrating enhanced walking ability with no pain.

3. Results

The baseline and immediate post treatment scores of Numeric pain rating scale (NPRS), Straight leg raise (SLR), and lower extremity functional scale (LEFS) has been shown in table 1. The outcomes indicated massive improvements immediately post session. The NPRS scores improved from 6 to 2 immediately post treatment. The SLR was improved to 95degree post treatment and lower extremity functional scale improved from 16(20%) to 75(94%) indicating massive improvements. The graphical representation is shown in figure 1.

TABLE 1: Baseline and Post Treatment scores of NPRS, Hip ROM (flexion, abduction, internal rotation (IR) & LEFS

	Baseline	**Post Treatment**
NPRS	6	2
SLR(in degrees)	30	95
Hip Abduction(in degrees)	20	40
Hip IR(in degrees)	17	36
LEFS (in %)	20	93.8

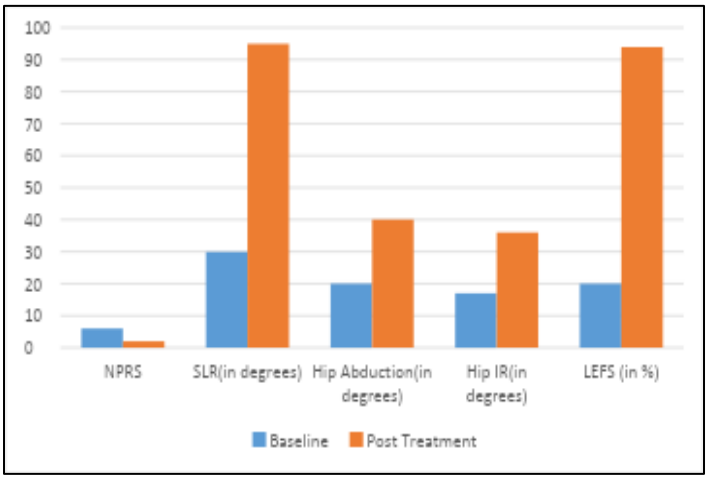

FIGURE 1: Graph demonstrating baseline and immediate post treatment scores of NPRS, HIP ROM and LEFS

4. Discussion

This case study investigated the immediate effect of PNF hold relax exercise of hamstring along with quads strengthening exercises in improving pain, ROM and lower extremity function in patients with piriformis syndrome. The results of the study showed that PNF hold relax exercise of hamstring along with quads strengthening exercises have immediate effects in relieving pain and improving mobility and lower limb function. Even though there is evidence regarding stretching exercises in the treatment of piriformis

syndrome, there is lack of evidence regarding the effect of quads strengthening in the treatment of piriformis syndrome. This study is the first to report the immediate effectiveness of quads strengthening exercise in the management of Piriformis syndrome. These findings are aligned with the previous studies which have demonstrated the benefits of strengthening hip joint muscles along with stretching exercises including PNF hold relax in reducing musculoskeletal dysfunctions by increasing circulation, reducing spasm and enhancing neuromuscular control. The current study demonstrated the effectiveness of stretching exercises along with quads strengthening exercises in the treatment of piriformis syndrome (PS).

A study demonstrated that hip abductor and extensor strengthening along with neural mobilisations and stretching exercises are effective in enhancing the hip abductor strength and functional status in piriformis syndrome. The piriformis muscle becomes overstressed due to weakness of hip muscles including hip abductor & extensors, resulting in spasm of piriformis muscle, ultimately compressing the sciatic nerve. So, strengthening of those muscles is needed to reduce strain on the piriformis muscle. The current study demonstrated that combining the quads strengthening along with stretching exercises resulted in massive improvements in pain and quality of life. [6] A case study about the treatment of a patient having piriformis syndrome revealed that the treatment plan focusing on hip muscle strengthening and correction of faulty lower limb movement patterns had significant outcomes. There were clinically significant findings in the absence of the usual treatment protocol i-e; stretching, soft tissue mobilization, injections. That is why the management plan focusing on strengthening of weak muscles may be beneficial in patients having piriformis syndrome. The current case study involved the strengthening of quads muscle along with PNF hold relax of the hamstring and demonstrated significant immediate improvements in pain, and lower limb function. [8] .It has been found that strengthening of hip abductors along with sciatic nerve mobilization is effective in improving lower limb motor function. The current study involved quads strengthening instead of abductors strengthening and showed robust improvements in pain, range of motion and lower limb function. [9]

The evidence supports the effectiveness of PNF stretching in improving range of motion and reducing pain in patients having piriformis syndrome, offering a promising rehabilitation strategy. The current study involves the PNF hold relax of hamstring muscle with quads strengthening and found immediate improvements in pain, range of motion and lower limb motor function . [10]

Conclusion:

The current case study demonstrated robust immediate improvements in pain, ROM and lower limb function after the treatment concluding that Quads strengthening along with PNF hold relax of the hamstring has immediate effects in resolution of symptoms and improvement in lower motor function.

Limitations

The single session was not sufficient enough for the complete resolution of symptoms and functional recovery. Furthermore, more studies with larger sample size and randomized controlled trials are warranted to compare the long term effectiveness of the techniques.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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