

# The Effect of Physiotherapy Intervention by Using Ultrasound and Piriformis Stretching in Management to Reduce Pain in Piriformis Syndrome

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**Abstract:-** Piriformis syndrome is a condition characterized by the presence of piriformis muscle disorders, in which patients complain of pain in the buttocks area. In piriformis syndrome, there is compression of the sciatic nerve by the spasming piriformis muscle which causes daily functional disturbances in the form of pain, tingling and numbness. Delay in diagnosis can lead to chronic somatic dysfunction and muscle weakness and other more complex functional disorders. This study aims to prove the effectiveness of ultrasound intervention and stretching of the piriformis muscle as a physiotherapeutic approach in managing pain reduction in piriformis syndrome. The type of research used is Quasi Experiment research with pre and post test without control group design. In this treatment group using the normality test using the Shapirowilk test on all pre-test and post-test variables, the p value > 0.05 which means the data is distributed normally. Then the data from the treatment group obtained normality test results before  $P > 0.160$  which means  $P > 0.05$  and the value after intervention  $P < 0.017$  which means  $P > 0.05$  then the results of the hypothesis using the paired sample t-test Test in this study obtained a value  $P = 0.000$  ( $P < 0.05$ ) with a mean value of  $0.507 \pm 4.418$ , which means that the intervention of ultrasound and stretching treatments was significant in reducing pain scores in piriformis syndrome.

**Keywords:-** Piriformis Syndrome, Physiotherapy, Ultrasound, Stretching.

## I. INTRODUCTION

Piriformis syndrome refers to symptoms of buttock pain involving the piriformis muscle above it and do not originate from spinal root compression [1]. In the physical examination to establish a proper diagnosis, radiographic studies and neuroelectric tests as supporting investigations also need to be used to narrow the differential diagnosis of piriformis syndrome. Physiotherapy can be used alone or in conjunction with drug interventions in conjunction with piriformis syndrome pain management in an attempt to avoid surgical intervention. [2].

Piriformis syndrome is a sciatic neuropathy condition that occurs due to the piriformis muscle pressing on the sciatic nerve which can be classified into primary and secondary. the primary condition is caused by an intrinsic pathology originating in the piriformis muscle such as

myofascial pain or myositis ossificans due to trauma, the secondary condition is caused by other causes of hip pain due to pathology of the adjacent structures of the sciatic notch. [3].

The piriformis muscle originates from the upper surfaces of the sacral vertebrae, namely Sacral 2 to Sacral 4, the sacroiliac joint capsule, and the gluteal surface of the ilium near the posterior surface of the iliac spine. It runs laterally through the greater sciatic foramen, and inserts into the piriformis fossa on the medial aspect of the greater trochanter of the femur. The piriformis muscle is innervated by the ventral rami branches of the lumbar 5, sacral 1, and sacral 2 spinal nerves. Then several nerves are under and pass through this muscle such as the sciatic nerve, posterior femoral cutaneous nerve, gluteal nerve, and gluteal vessels. [4].

Pain and numbness along the back of the lower leg down to the foot can occur if the piriformis muscle, which is located below the gluteus maximus muscle, spasms and presses on the sciatic nerve below it. Piriformis syndrome is mainly found in the 4th to 5th decades of life, which generally occurs in women, with a 6:1 female-to-male ratio. about 6% of patients with complaints of low back pain are diagnosed with piriformis syndrome but the prevalence rate of piriformis syndrome is not known with certainty but is estimated to range from 5-36%. Primary piriformis syndrome is related to the anatomic location of the piriformis muscle and sciatic nerve. Secondary piriformis syndrome is caused by microtrauma, macrotrauma, and local ischemia. Meanwhile, primary piriformis syndrome occurs in 15% of cases with a diagnosis of piriformis syndrome [5].

Patients with piriformis syndrome often experience pain, numbness in the gluteus muscles, burning and tingling sensation when moving the hips [6]. The pain felt by sufferers is mechanical, meaning it is closely related to body movement and position. The pain increases when standing and sitting for long periods of time and decreases when resting in a lying position. [7].

Many other causes of low back pain that make up the differential diagnosis of piriformis syndrome include buttock pain, and sciatica including radiculopathy, greater trochanteric pain syndrome, and intrinsic pain in the buttocks muscles and associated tendons and fascia, lumbar spinal stenosis, pain that occurs related to the sacroiliac (SI) joint,

pain that occurs related to the hip joint, and pain that occurs related to the facet joint [8].

The piriformis muscle is a muscle located under the gluteus maximus muscle near the top of the hip joint, which is also part of the external rotator hip muscle group. This muscle is important for moving the leg, stabilizing the hip joint and lifting and rotating the thigh away from the body. This muscle is also responsible for stabilizing the hip joint and moving the thigh in various directions enabling the individual to walk, transfer weight from one leg to the other (side to side), and maintain balance. This muscle is also used in sports that involve lifting and twisting the thigh as well as almost every hip and leg movement. Beneath this muscle lies the sciatic nerve which is the longest nerve in the human body [9].

When the piriformis becomes tight it can put pressure on the sciatic nerve causing irritation and sending pain to the back of the leg / sciatica so People with piriformis syndrome may have difficulty walking or other functional activities because Symptoms include buttock pain that radiates to the hip, posterior aspect of the thigh and proximal lower limbs that worsen with sitting or squatting [10].

The use of heat therapy such as ultrasound followed by gentle stretching of the piriformis muscle is effective in therapeutic measures in cases of piriformis syndrome [11]. The depth of Ultrasound is to break down myofascial triggers in the piriformis muscle so that the therapeutic use of Ultrasound has the potential to treat cases of piriformis syndrome accurately whereas physiotherapy treatment in the form of stretching of the piriformis muscle helps in reducing the pain felt in piriformis syndrome [12].

Piriformis muscle stretching is a physiotherapy method commonly used for patients diagnosed with piriformis muscle syndrome. Stretching is done with the aim of increasing the length of the piriformis muscle which had shortened so that it compresses the sciatic nerve. The piriformis muscle stretch is performed in a standing or prone position, which involves complex movements, including knee flexion and coxal articulation, and internal-external rotation of the thigh [13].

**II. RESEARCH METHOD**

The method used in this study is a Quasi-Experimental Study with a One Group Pre-Test-Post-Test Design, which aims to determine the value before and after the intervention of ultrasound and piriformis muscle stretching. Pain measurement using Visual Analog Scale (VAS) was examined before and after being given treatment 12 times for one month. This implementation has been completed from 01 to 31 October 2021.

**III. RESULT S AND DISCUSSION**

The description of the characteristics of the research sample subjects including data on age (years), gender, occupation, weight (kg), and height (cm) tested by descriptive analysis on SPSS are shown in Tables I and II:

Variables	N	Mean	Std. Deviation
Age	17	56.11	12.42
Sex	17	1.588	.5073
Occupation	17	3.118	1.616
Height	17	62.65	6.403
Weight	17	154.9	14.37

Table 1: Distribution of Samples Based on Descriptive Data in the Treatment Group

Table 1 describes respondents based on age, gender, occupation, weight, and height. In the treatment group with the number of samples (n = 17) it was found that the average age was 56.11 + 12.42. In this study, the average age obtained was 56 years, the average gender was 1.588+.5073, the average occupation was 3.118+1.616, the average weight was 62.65+6.403, the average height was 154.9+14.37.

Samples (n = 17)	Shapiro Wilk Normality Test	
	Treatments	
	Mean±SD	P
Before	7.059±1.088	0.160
After	2.647±1.057	0.017

Table 2: Normality Test

Table 2 describes the results of the Normality test based on the Shapiro Wilk test on all pre-test and post-test variables. The mean value before 7.059±1.088 and P value = 0.160 while the average value after 2.647±1.057 and P value = 0.017, then P> 0.05 then the data was concluded to be normally distributed, so that in this treatment group the Paired Sample T-Test was used.

Samples (n = 17)	Mean±SD	P
Before and After	0.507±4.418	0.000

Table 3: Pain Value Before and After Intervention Ultrasound and Piriformis Muscle Stretching

Table 3 describes the results of the differences before and after the intervention in the treatment group with a significant value of P = 0.000 (P<0.05) with a mean value of 42.00±10.65.

There is a difference in pain values in the piriformis muscle in the study measured using the Visual Analog Scale (VAS) before and after, because the piriformis condition has been given conservative intervention in the form of ultrasound and stretching which have the effect of relaxing the tense piriformis muscle, reducing compression of the sciatic nerve through stretching. Several studies have evaluated the efficacy of ultrasound-guided techniques [14].

Piriformis syndrome may occur due to muscle spasm, hypertrophy or tenderness. Variations in muscle anatomy can cause compression of the sciatic nerve resulting in hip pain. The incidence rate of Piriformis syndrome in patients with low back pain is 5%-36%. Piriformis syndrome is more recognized among women than men in a 6:1 ratio. The piriformis muscle is innervated by the L5, S1-S2 branches, the piriformis muscle acts as an external rotator and abductor when moving the thigh up to 60 degrees. Inflammation of the piriformis muscle can put pressure on the sciatic nerve so that

it goes down the leg, the condition can worsen with walking, squatting and unable to stand when sitting. In this study, physiotherapy can provide various interventions, one of which is ultrasound and the results show that the intervention is effective in reducing pain, increasing Range of Motion [15].

Several studies have demonstrated the reliability of Ultrasound (US) for curing piriformis muscle pain. Research conducted by Ridho [16] showed that the application of Ultrasound modality with a combination of Micro Wave Diathermy and Exercise Therapy could reduce pain. Research by Destyana [17] showed the Hold Relax Stretching intervention in Ultrasound therapy can reduce pain in cases of piriformis syndrome.

The application of stretching measures to piriformis syndrome has also proven effective as research conducted by Suwarni [14] who found that the combination of TENS and stretching was effective compared to reducing pain in cases of piriformis syndrome.

#### IV. CONCLUSION

Based on hypothesis testing using the sample paired sample test, the value of  $P = 0.000$  ( $P < 0.05$ ) means that there is a significant difference in the value before and after the intervention of ultrasound and stretching of the piriformis muscle. It shows that there is a decrease in Visual Analogue Scale value after Ultrasound and Piriformis Stretching intervention.

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