Indonesian Journal of Medicine (2024), 09(03): 349-353
Masters Program in Public Health, Universitas Sebelas Maret

Research
Open Access

The Effect of a Combination of Ultrasound and Stretching on the Pain Scores of Piriformis Syndrome Patients at the Padas Health Center, Ngawi Regency

Kelvin Teguh Imani, Achmad Fariz, Nurul Halimah, Angria Pradita

Institute of Science and Health Technology of dr. Soepraoen Kesdam V/Brw Hospital

Received: 03 December, 2023; Accepted: 18 February, 2024; Available online: 16 July, 2024

ABSTRACT

Background: Piriformis Syndrome is a pain in the pelvic area caused by prolonged or excessive contraction of the piriformis muscle so that the sciatic nerve is compressed or compressed. The physiotherapy treatment used is a combination of ultrasound and stretching. This study aimed to determine the effect of a combination of ultrasound and stretching in reducing pain in piriformis syndrome patients.
Subjects and Method: The design of this study was a one-group pre-experimental and post-test design with 20 respondents who met the inclusion and exclusion criteria using a purposive sampling technique carried out in September-October 2023. Respondents had their pain scale measured using VAS (Visual Analog Scale) before and after physiotherapy treatment, namely; giving a combination of ultrasound and stretching 2 times a week for 4 weeks.
Results: This study used the paired sample test hypothesis test with the median VAS value; (1) pre by 5.70; (2) posts by 3.35 and (3) P value by 0.00.
Conclusion: It can be concluded that the combination of ultrasound and stretching is effective in reducing pain in cases of piriformis syndrome.

Keywords: Ultrasound, stretching, piriformis syndrome

Correspondence:
Kelvin Teguh Imani. Institute of Science and Health Technology of dr. Soepraoen Kesdam V/Brw Hospital. Jl. S. Supriadi No.22, Sukun, Malang Regency, East Java 65111, Indonesia. Email: kelvinteguh1000@gmail.com. Mobile: 085708079991

Cite this as:
Imani KT, Fariz A, Haliman N, Pradita A (2024). The Effect of a Combination of Ultrasound and Stretching on the Pain Scores of Piriformis Syndrome Patients at the Padas Health Center, Ngawi Regency. Indones J Med. 09(03): 349-353. https://doi.org/10.26911/theijmed.2024.09.03.08.

BACKGROUND

Piriformis syndrome is a pathology in which the piriformis muscle causes irritation of the sciatic nerve. Around 70% -80% of the world's population experiences low back and low back pain, while around 17% of complaints that occur in the lower back experience Piriformis Syndrome (Musadhad, 2020).In research by Adiyatma and Kusuma (2022), the prevalence of Piriformis Syndrome is estimated to cause 0.3% of 6% of lower back and upper thigh (Posterior) pain, approximately 40 million worldwide, around 2.4 million new cases of Piriformis Syndrome every year. In Indonesia, the prevalence of ischialgia is 18-21%, 13.6% in men and 18.2% in women. The ratio of women to men affected is 6:1 (Dakou et al, 2020). Around 15% of the population of sciatica (ischialgia) cases and 6% of low

back pain cases are piriformis syndrome with a prevalence aged 18-55 years (Ihsan&Anshar 2018). The number of patient visits complaining of piriformis syndrome at the Padas Health Center, Ngawi Regency was 30 people in the last 2 months in July-August 2023.

Piriformis Syndrome occurs because the sciatic nerve (nervus ischiadicus) is compressed or irritated by the piriformis muscle, causing pain and tingling in the buttocks area and along the path of the sciatic nerve. The occurrence of pain in piriformis syndrome is because the muscle experiences local ischemia, blood flow is not smooth in the piriformis muscle area due to muscle spasm (Aji, 2018). Symptoms that can be caused in cases of Piriformis Syndrome usually consist of pain in the buttocks, pain in the back of the thigh and can spread to the back of the lower thigh. Usually the pain can increase when sitting or standing, in general, people who suffer from piriformis syndrome will usually experience pain when walking because of the pain they feel. If the problems caused are not given any intervention, it will lead to further incapacity such as daily activities. Therefore, appropriate and efficient interventions are needed to reduce these limitations. Non-surgical and non-pharmalogical interventions are really needed, such as physiotherapy.

Physiotherapy treatment for piriformis syndrome patients is done by giving ultrasound intervention which functions to reduce pain in Piriformis Syndrome conditions (Haryoko., 2019) and exercise therapy in the form of stretching which is also effective in reducing pain in Piriformis Syndrome patients (Alarab et al., 2020). Ultrasound has been used in the treatment of musculoskeletal conditions for many years. US (Ultrasound) equipment consists of a generator and transducer. The generator produces electromagnetic energy with a frequency of 0.5 to 3.5 MHz, which is converted by the transducer into mechanical energy with the same frequency and intensity up to 3 watts/cm2. US itself is a sound wave that has elongated properties and requires a medium for penetration such as water or gel. The frequency used in therapy is usually between 1 and 3 MHz. With the micromassage and thermal effects of ultrasound, it can reduce pain because the heat generated can help vasodilate blood vessels and result in increased blood circulation to the area so that irritants that cause pain can be removed properly and enter the bloodstream so that pain is reduced.

Stretching is an exercise in which muscles are stretched to increase internal muscle elasticity to achieve comfortable muscle tone. Stretching aims to increase joint movement (flexibility), reduce muscle tightness (spasm), increase circulation, and reduce muscle pain. Stretching can improve blood circulation which is hampered by muscle spasms and continuous muscle contractions. By gently stretching the piriformis muscle which is experiencing spasm, it will relax, thereby reducing the spasm so that the muscle pressure on the sciatic nerve will decrease and the pain will also decrease.

In this study, the author wants to combine the two interventions because based on previous research, there were significant results on reducing pain. Ultrasound and stretching interventions both have the function of reducing pain. By combining these two interventions, it is hoped that maximum results are achieved in reducing pain in cases of piriformis syndrome.

SUBJECTS AND METHOD

1. Study Design

The study design used was the one group pre and post-test design method. Respondents were measured before being given treatment (pre-test), then given the treatment, then measured again (post-test) at the end of the research session to determine the effect of the treatment so that the results of the experiment could be known with certainty. This study was conducted at the Padas Health Center, Ngawi Regency from September 2023 to October 2023

2. Population and Sample

The total population at the study location was around 30 respondents in the last 3 months. Respondents suffering from Piriformis Syndrome who fit into the inclusion and exclusion criteria and used a sampling technique in the form of purposive sampling were 20 people. Inclusion criteria are; 1) Patients at the Padas Health Center Physiotherapy Polyclinic, Ngawi Regency with complaints of piriformis syndrome, 2) Patients willing to be study objects, 3) Patients with VAS scores of 4-8. Exclusion criteria: 1) Patients taking anti-pain medication less than 10 hours before being given physiotherapy treatment, 2) Patients with complaints of lombosacral HNP, 3) Patients with complications of other diseases such as malignancies (tumors), 4) Patients who are experiencing burns in the pelvic area, 5) Patients who are suffering from skin disease in the pelvic area. Drop Out: 1) The patient is irregular in carrying out research procedures 2) The patient withdraws as a research respondent.

3. Study Variables

The dependent variable in this study was the pain of piriformis syndrome patients at the Padas Health Center, Ngawi Regency. The independent variable in this study was a combination of ultrasound and stretching.

4. Definition of Operational Variables

Pain is an unpleasant sensory and emotional experience resulting from tissue damage, either actual or potential or described in the form of such damage.

Piriformis syndrome is a pathology where the piriformis muscle causes irritation of the sciatic nerve or ischiadicus nerve, causing pain in the piriformis area and sometimes it can also spread along the ischiadicus nerve.

Ultrasound is a physiotherapy intervention that uses mechanical vibrations of sound waves and requires a medium for penetration such as water or gel.

Stretching is an exercise where muscles are stretched to increase muscle elasticity, reduce spasm, and reduce muscle pain.

5. Study Instruments

The respondents who were examined had their pain values measured before and after the treatment, the scale used is the Visual Analog Scale (VAS). VAS aims to determine the pain felt by the patient (Marwati, 2020). The treatment is a combination of ultrasound and stretching. This combination of ultrasound and stretching treatment is carried out on piriformis syndrome patients by 2x/week for 8x treatments.

6. Data analysis

The data that has been obtained is then processed using the SPSS application. The collected data was tested through a normality test using the Shapiro Wilk test. The resulting data distribution is a normal data distribution so it uses a paired sample test.

7. Study Ethics

This study has received research ethics permission from the STRADA Kediri research ethics committee.

RESULTS

Table 1. General data distribution of piriformis syndrome patients at the Padas Health Center

Characteristic	n	%
Gender		
- Male	8	40
- Female	12	60
Age		
- 37-50 Years old	6	30
- 51-64 Years old	14	70
Total	20	100

Based on Table 1 above, the results showed that there were more female respondents than male. Meanwhile, in terms of age, the highest percentage was 51-64 years old, which was 70%.

Table 2. The Effect of a Combination of Ultrasound and Stretching on Pain

Pain Scale	Median (minimum-maximun)	Mean ± Std. Deviation	Score P
VAS before treatment	5,7 (4,5-7,5)	5,83 ± 0,7787	0,000
VAS after treatment	3,35 (2,0-4,8)	3,365 ± 0,8165	

In Table 2 above, the minimum score before treatment is 4.5 and the maximum score is 7.5 and the median score is 5.7. The minimum score after treatment is 2.0 and the maximum score is 4.8 and the median score is 3.35. Pain scores using VAS before treatment and after treatment combined with Ultrasound and Stretching showed a significant change as seen from the paired sample test, p score < 0.005.

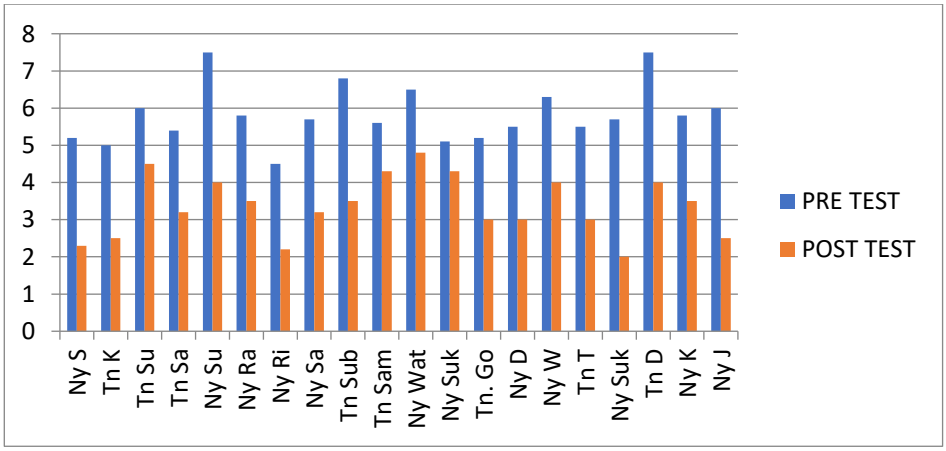

Figure 1. VAS score results before (pre test) and after (post test) treatment

DISCUSSION

Respondents based on gender consisted of 12 female respondents (60%) and 8 male respondents (40%). This is in accordance with research by Salmi and Rosella (2020) that more women experience piriformis syndrome than men. The youngest respondent was 37 years old and the oldest was 64 years old. There were 6 respondents aged 37-50 years and 16 people aged 51-64. By the time they reach the age of 50, more than 95% of people will experience anatomical changes that occur naturally in the lumbosacral area for a long time, which can cause problems in the lower back and surrounding areas (Mushin & Ihsan, 2019).

Piriformis syndrome is a pathology where the piriformis muscle causes irritation of the sciatic nerve or sciatic nerve. Piriformis syndrome is caused by prolonged or excessive contraction of the piriformis muscle. The cause of piriformis syndrome is often due to excessive use, such as sitting for too long (Zuhri & Suwarni, 2020). The occurrence of pain in piriformis syndrome is due to the muscle experiencing local ischemia, poor blood flow in the piriformis muscle area due to muscle spasms (Aji, 2018). In this study, the author used ultrasound and stretching interventions which is given to piriformis syndrome patients. Ultrasound has been used in the treatment of musculoskeletal conditions for many years.

Ultrasound modality is a physio-therapy modality that utilizes electro-magnetic waves which have penetration into deep tissue. This is able to provide a micro massage effect on muscle fibers which can trigger increased circulation in damaged muscle tissue, and the thermal effect provides a warm sensation in the area where the ultrasound is applied. The thermal effect is able to accelerate metabolism in shortened tissue, thereby increasing muscle flexibility and reducing the degree of spasm (Ismaningsih & Kurniawan, 2023). US (Ultrasound) equipment consists of a generator and transducer. The generator produces electromagnetic energy with a frequency of 0.5 to 3.5 MHz, which is converted by the transducer into mechanical energy with the same frequency and intensity up to 3 watts/cm2. US itself is a sound wave that has elongated properties and requires a medium for penetration such as water or gel. The frequency used in therapy is usually between 1 and 3 MHz (Khatri, 2018). The results of a study done by Popoola (2020) concluded that ultra-sound can be used in the management of Poirifrmis Syndrome.

Stretching is an exercise in which muscles are stretched to increase muscle elasticity and to achieve comfortable muscle tone. Stretching aims to increase joint range of motion (flexibility), reduce muscle tension (spasm), improve circulation, and reduce muscle pain. Research done by Ismaningsih (2022) determined the value before and after US intervention and stretching of the piriformis muscle. Pain measurement using the Visual Analog Scale (VAS) was checked before and after treatment by 12 times in one month. This implementation was conducted from 1 to 31 October 2021. It was concluded that there was a decrease in the Visual Analog Scale score after being given Ultrasound and Stretching intervention for Piriformis Syndrome. With the micromassage and heating effect produced by ultrasound, it can reduce pain, where the heat generated can help vasodilate blood vessels and result in increased blood circulation to the area so that irritants that cause pain can be removed properly and enter the bloodstream so that the pain is reduced. (Hayes, 2014). The results of research by Umi and Komalasari (2021) show that the pain score showed a

decrease between the pre-test and post-test after being given treatment in the form of 3 piriformis muscle stretching movements, each stretching carried out in 3 sets of 8 repetitions. It was concluded that stretching is useful for reducing pain in individuals with piriformis syndrome. Stretching can improve blood circulation which is obstructed due to muscle spasms or continuous muscle contractions. By stretching, the piriformis muscle which is experiencing spasm will relax, thereby reducing the spasm so that the muscle pressure on the sciatic nerve will decrease and the pain will also decrease. Both ultrasound and stretching interventions have a good function in reducing piriformis syndrome pain, therefore, the combination of ultrasound and stretching in this study was proven to have an effect on reducing piriformis syndrome pain.

AUTHORS CONTRIBUTION

Kelvin Teguh Imani conducted observations at Padas Health Center, Ngawi Regency before conducting the study. Achmad Fariz, Nurul Halimah and Angria Pradita helped, guided, and evaluated during the creation of the article.

FINANCIAL SUPPORT AND SPONSORSHIP

This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

ACKNOWLEDGEMENT

We would like to thank all participants involved in this study. Special thanks to Mr. Achmad Fariz, Mrs. Nurul Halimah, and Mrs. Angria Pradita who guided us during the study. We also thank the lecturers and all friends of AJ 3 Bachelor of Physiotherapy ITSK DR Soepraoen Kesdam V/Brw Hospital, Malang, who supported this study.

REFERENCE

Adiyatma H, Kusuma SN (2022). Piriformis syndrome. Pain Medicine: An Essential Review. 479–481. DOI: 10.21776/ub.jphv.2022.003.01.5

Alarab A, Unver F (2020). Stretching exercise versus tissue mobilization technique in piriformis syndrome. Eur J Health Sci. *2*(6). DOI: 10.24018/ejmed.-2020.2.6.610

Aji B, Prasetyo EB (2018). Penatalaksanaan fisioterapi pada kondisi piriformis syndrome dekstra dengan modalitas tens, friction dan metode terapi latihan di RSUD BENDAN. Jurnal Ilmu Penge-tahuan dan Teknologi. *32*(2): 18-23. DOI: 10.31941/jurnalpena.v3-2i2.802

Dakou M, Iakovidis P, Lytras D, Kottaras I, Kottaras A, Chasapis G (2021). The effect of physiotherapy in the treatment of piriformis syndrome: A narrative review. *Nat J Clin Orthopaed. 5*: 24-26. DOI: 10.33545/orthor.2021.v5.i2a.278

Haryoko I (2019). Perbedaan Penambahan Hold Relax Stretching pada Intervensi Ultrasound Terhadap Gangguan Gerak dan Fungsi Ekstremitas Bawah Akibat Piriformis Syndrome (Differences in Adding Hold Relax Stretching to Ultrasound Intervention on Lower Extremity Movement and Function Disorders Due to Piriformis Syndrome). Jurnal 'Aisyiyah Medika. 3(1). DOI: 10.-36729/jam.v3i1.959

Hayes KW (2014). Agens Modalitas untuk Praktisi Fisioterapi. Edisi 6. Jakarta: EGC

Ihsan M, Anshar A. (2020). Beda pengaruh pemberian contrax relax dan hold relax terhadap penurunan nyer akibat syndrome piriformis di RSUD Arifin Nu'mang Sidenreng Rappang (Differences in the influence of contrax relax and hold relax on the reduction of nyer due to piriformis syndrome at Arifin Nu'mang Sidenreng Rappang Hospital). Media Fisioterapi Politeknik Kesehatan Makassar. *12*(1): 31-38. DOI: 10.3-2382/mf.v12i1.1590

Ismaningsih I, Kurniawan G (2023). Physiotherapy care in case of piriformis syndrome using Microwave Diathermy (MWD) modalities and giving Strain Counterstrain (SCS) techniques to reduce pain. JIKA (Jurnal Ilmu Kesehatan Abdurrab). *1*(1): 23-28. https://jurnal.univrab.ac.id/index.php/jika/article/view/3553

Ismaningsih,Y R 2022. The effect of physiotherapy intervention by using ultrasound and piriformis stretching in management to reduce pain in piriformis syndrome. International Journal of Innovative Science and Research Technology. https://-www.ijisrt.com/assets/upload/files/IJISRT22JAN353_(1)_(1).pdf

Khatri SM (2018) Elektroterapi. 2nd Edition. Jakarta: EGC.

Marwati AW, Rokayah C, Herawati Y (2020). Pengaruh progressive muscle relaxation terhadap skala nyeri pada pasien post sectio caesaria. Jurnal Ilmu Keperawatan Jiwa. *3*(1): 59-64. DOI: 10.32584/jikj.v3i1.472

Musadhad MG (2020). Studi literatur penatalaksanaan fisioterapi pada piriformis syindrome dengan metode ultrasound dan terapi latihan (Literature study of physiotherapy management in piriformis syndrome using ultrasound methods and exercise therapy). Doctoral dissertation, Universitas Muhammadiyah Gresik. http://eprints.umg.ac.id/-3961/

Popoola IS (2020). *A* case study: combination of physiotherapy and osteopathic manual therapy technique in the management of piriformis syndrome. Doctoral dissertation, National University of Medical Sciences). https://-www.numss.com/Thesis/COMBINATION%20OF%20PHYSIOTHERAPY%20AND%20OSTEOPATHIC%20MANUAL%20THERAPY.pdf

Salmi U, Sari DRK (2021). The effect of self stretching on pain levels due to piriformis syndrome at Teras Health Center, Boyolali District. Physiotherapy Conference Proceeding. https://proceedings.-ums.ac.id/index.php/apc/article/view/116

Zuhri S, Suwarni S (2022). Efektivitas mobilisasi saraf nervus ischiadicus pada kasus ischialgia et causa sindroma piriformis setelah diberikan terapi standar .Journal of Health and Therapy. *2*(2), 22-31. https://journal.mrc-rizquna.com/index.php/jht/article/view/66