



Ultrasound Therapy and Towel Exercise to Increase Ankle Rom and Functional Activity in Plantar Fasciitis

Nabila Fajrin Aryani Hasan¹⁾, Agung Hermawan^{2)*}

^{1,2)} Prodi D3 Fisioterapi Fakultas Ilmu Kesehatan, Universitas Pekalongan

Email: Agungh110@gmail.com

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ABSTRACT

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Introduction: Plantar fasciitis occurs due to excessive activity such as standing or walking for a long time and causes micro injury to the plantar fascia muscle which experiences constant stretching repeatedly. The purpose of this study was to determine the effect of physiotherapy management on plantar fasciitis with ultrasound therapy and towel exercise modalities. **Method:** this research using descriptive analytic methods, the therapy was carried out 5 times. **Result:** there was an increased range of motion from T1: S = 10°-0°-40° to T5: S = 15°-0°-45°. Increased functional activity from T1: 45% to T5: 51%. **Conclusion:** The conclusions from this study are increased range of motion of the ankle joint and functional activity in the ankle.

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INTRODUCTION

The ankle functions as the center of support for the body when standing, walking, and running; the ankle receives the body's weight alternately when walking or running. As a result, constant mechanical trauma causes ankle pain. Approximately 10% of the United States population experiences pain from plantar fasciitis, resulting in one million professional visits for treatment and more than 600,000 outpatient visits each year. (Goweda et al., 2015). According to data obtained from the annual report of the Medical Rehab Clinic, Bhakti Wira Tamtama Army Hospital, Semarang, Central Java, in 2017, the number of patients who experienced plantar fasciitis from January to December was 67. This is done to increase the strength of weak muscles, which are sometimes caused by pain. (Abidin et al., 2018). Based on data from the Medical Rehabilitation Polyclinic at RSUD Dr. Soeselo, Tegal Regency, 2022 shows cases of plantar fasciitis. Inflammation of the plantar fascia origin in the calcaneus occurs due to overstretching, microstructure, or degenerative. During this process, pain causes a decrease in the ability to move, which results in decreased strength, endurance, and stability of muscles as well

as joint flexibility. (Pratama, 2021). Pain caused by plantar fasciitis can affect work productivity and interfere with activities or functional abilities. (Masfuroh, 2017).

The mechanism for plantar fasciitis is that excessive load causes the degenerated plantar fascia to pull repeatedly, causing micro-injury. The constant and repeated stretching force causes the fascia, which is the outer layer of the plantar arch, to experience pressure at its origin or tear at the attachment site, which causes pain. (Siburan, 2008)

In cases of plantar fasciitis, musculoskeletal disorders occur in heel support activities. To reduce the degree of musculoskeletal disorders which result in the appearance of tenderness in the calcaneus, decreased range of motion of the ankle joint, spasm of the gastrocnemius muscle and Achilles tendon, decreased muscle strength in the ankle and decreased functional ability activities, it is necessary to undergo physiotherapy treatment using ultrasound therapy and towel exercise modalities. The size of the crystal and the frequency of the applied current determine the frequency of the longitudinal sound waves used in ultrasound therapy. Ultrasound therapy waves to treat plantar fasciitis can have a thermal or mechanical effect on the area absorbed by the waves. The absorption of waves by various tissues when applied to the tissue results in the production (Hayes, 2014).

Towel exercise is a form of exercise using a towel with a rolling movement by gripping the toes that aims to increase the functionality of the ankle by strengthening the intrinsic muscles in the feet, both at the neuromuscular junction and in the muscle fibers, so that the balance component can be fulfilled. These exercises activate muscles to their maximum and focus on movements involving core muscle work. (O'Driscoll et al., 2011). Towel exercise for plantar fasciitis aims to improve ankle function by strengthening the foot's intrinsic muscles. (Audini & Wibowo, 2018). This study aimed to prove the effectiveness of ultrasound therapy and towel exercise in increasing joint range of motion (LGS) and ankle functional activity in plantar fasciitis patients.

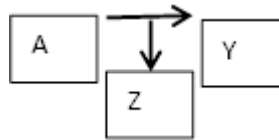
METHOD

In this research, the author used analytical and descriptive methods. Descriptive analytics examines the status of a human group, object, set of conditions, a system of thought, or class of events in the present. Analytics aims to find out assessments and changes that can be seen in the research. (Notoatmojo, 2010). This case study research was conducted in January 2023 at RSUD Dr. . Soeselo, Tegal Regency. The subjects of this study were patients with left plantar fasciitis who were given physiotherapy intervention with ultrasound therapy and towel exercise. Conclusions will be drawn from the results of the study through evaluation.

The design used in this research is a case study design. Research variables are concepts at various abstract levels that are defined as a facility for measuring and/or manipulating research. There are two types of variables, namely independent variables and dependent variables. The independent variables in this study were ultrasound therapy modality and towel exercise. The dependent variables in this research are the factors that are measured and observed, including the presence of pain, muscle spasms, decreased joint range of motion, decreased muscle strength, and decreased functional activity.



The research design is described as follows:.



Information:

X: The patient's previous condition
given a physiotherapy program

Y: Patient's condition after administration
physiotherapy program

Z: Physiotherapy program

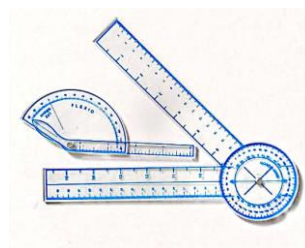
RESULT

After being given a physiotherapy intervention for the patient Mrs. H.N.S. with a diagnosis of left plantar fasciitis from T1 to T5 using ultrasound therapy and towel exercise modalities, the final results of the therapy were an increase in the range of motion and an increase in ankle functional activity.

The research instruments in this study are as follows:

Joint Range of Motion (LGS)

Joint scope of motion is the wide range of motion that a joint can carry out, which can occur due to muscle contractions being tested (Mardiman et al., 1994). The range of motion of the joint is measured with a goniometer. A goniometer is a measuring instrument shaped like a ruler that contains numbers in degrees and is one of the evaluation techniques most often used in physiotherapy practice (Mardiman et al., 1994).



Picture 2. Goniometer
(Personal Documentation)

Functional Activities

Functional activity is a description of the patient's ability to carry out daily functional activities such as self-care, lifting, walking, sitting, standing, sleeping, and squatting.

The Foot and Ankle Disability Index (FADI) aims to measure the intensity of disability in the foot and ankle through a questionnaire containing 26 statement items, consisting of 4 pain intensity items and 22 daily activity items (Reeder et al., 2013).

Data collection techniques

Physical Examination

Aims to determine the patient's physical condition. This examination consists of vital signs, palpation, a basic movement examination, and specific examinations, which include:

Windlass test

The windlass test aims to identify the presence of plantar fasciitis. Sensitivity: 32%, and test specification: 100%. The patient's position is sitting on the bed with his feet on a stool or chair, with his toes positioned at the end of the stool or chair. The therapist is next to the patient's feet, where the test will be carried out. Then the therapist moves the patient's big toe towards extension. The test is positive if the patient feels pain or increased pain at the plantar fascia insertion (Arisandy, 2019).



Picture 3. *Windlass test*
(Arisandy, 2019).

Talar Tilt Test

Talar tilt test to identify rupture of the antero-talofibular ligament and calcano-fibular ligament. The sensitivity of the test is 67%, and the specificity of the test is 75%. The patient's position is sitting on the edge of the bed with the ankles and feet hanging down. Position the examiner next to the patient's leg to be tested. Position the patient's feet in a position of 10°-20° plantar flexion. Then, stabilize the distal lower leg with one hand just proximal to the ankle. Next, invert the patient's hindfoot with the therapist's other hand, accompanied by palpation of the lateral aspect of the talus to confirm if tilting occurs (Arisandy, 2019).

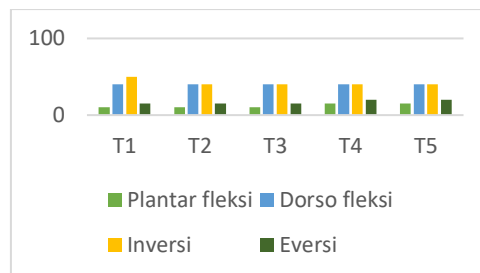


Picture 4. *Talar tilt test*
(Arisandy, 2019).



Scope of Joint Motion

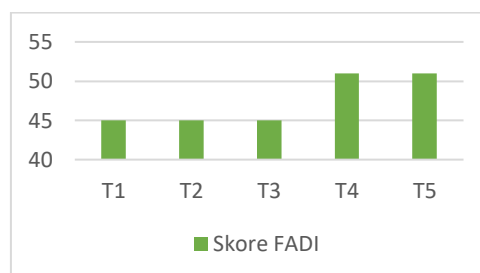
Graph 3. Evaluation of the range of motion of the joint



Based on the graph above, the results show that there is an increase in the range of motion of the joints at T1 with a degree value of Sa = 10°-0°-40°, Ra = 15°-0°-40° to a degree value of Sa = 15°-0°-40°, Ra = 20°-0°-40° in T1 and T5 in left plantar fasciitis.

Functional Activities

Graph 5. Evaluation of functional activities



Based on the graph above, the results show an increase in functional activity at T1 from a value of 45% (severe limitations) to a value of 51% (moderate limitations) at T1 and T5 in the condition of left plantar fasciitis.

DISCUSSION

Based on the results that have been presented, range of motion (ROM) and functional activity increased in patients after being given therapy up to five times using ultrasound therapy and towel exercise modalities. Five times in this basic from Kuswarnai Research Journal and literature study. This is in accordance with research (Kuswardani et al., 2018) entitled "The Influence of Infrared, Ultrasound, and Exercise Therapy on Plantar Fasciitis," which states that towel exercise is a form of exercise with the aim of stretching the muscles so they can relax more. Soft tissue stretching techniques reduce muscle tension and can increase joint range of motion. Increasing ROM in plantar facitis patients will have an impact on increasing functional activity, where this increase will reduce movement limitations. The increase in ROM was caused by the relaxing effect on the

plantaris muscle after the ultrasound was given. This can occur due to the micromassage effect of therapeutic ultrasound, which can reduce muscle spasms. Apart from that, adding towel exercise as a form of a form of strengthening and active training can indirectly increase ROM according to pain tolerance. Active exercise done regularly can reduce pain and increase joint stabilization, especially in muscles.(Franca et al., 2010). Active exercise will also increase immunity, which can have an impact on accelerating the healing process. This is because patients with plantar fasciitis experience inflammation of the tendons, so if they are not given exercise, it will cause a buildup of lactic acid and calcification, thereby worsening the condition.(Oliveira et al., 2018). Active exercise with a towel can speed up the proliferation process, which absorbs waste substances such as lactic acid so that they do not accumulate.

The results of this research show that towel exercise is effective in increasing the range of motion of the ankle joint in conditions of plantar fasciitis because there is a decrease in pain and an increase in muscle flexibility so that the range of motion of the ankle joint increases. This is not in accordance with research (Kuswardani et al., 2018) entitled "The Effect of Infrared, Ultrasound, and Exercise Therapy on Plantar Fasciitis," which stated that the use of infrared modalities, ultrasound therapy, and exercise therapy with a total of 8 participants was proven to be effective in increasing activity abilities. participant's foot function significantly. The results of this research show that ultrasound therapy and towel exercise are effective in increasing functional activity in the condition of plantar fasciitis because there is a decrease in the degree of pain, increasing ankle muscle strength for plantar flexion and dorsal flexion movements, which will increase the ability of the foot's functional activities.

CONCLUSION

The results of this research suggest that providing ultrasound therapy and towel exercise can increase the range of motion of the ankle joint and increase functional activity.

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