

Effective Impact of Tennis Ball Exercise Combined with Stretching on Pain Relief and Increased Functional Mobility in Plantar Fasciitis Patients

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Abstract

Background: Plantar fasciitis is a painful condition resulting from inflammation of the plantar fascia. Patients experience discomfort in the arch of the foot and at the heel tip (calcaneus bone).

The scope of this study was to alleviate pain, enhance foot mobility, and decrease swelling and stiffness.

Case Description A 47-year-old woman experienced pain at the heel of her left foot when she got out of bed in the morning and after sitting.

Symptoms* Pain: Sharp pain in the arches of the foot and heel. The pain was aggravated by prolonged standing and sitting.

Investigation: X-ray and ultrasound Physical assessment: Goniometry → ROM-pain

History Onset Location Relieving factor: The Windlass test

Uniqueness of the study: This case study highlights the advantages of integrating tennis ball exercises with stretching in the conservative physiotherapy management of plantar fasciitis.

Intervention:-

Stretching: You should perform stretching exercises that include the plantar fascia, Achilles tendon, and calf muscle. **Tennis Ball Exercise*** The patient sits on a chair. Rolling a tennis ball under the foot provides a massage effect and applies pressure to specific areas.

Results: After physiotherapy treatment, including tennis ball exercises and stretching techniques, the patient experienced a noticeable reduction in symptoms.

Discussion: Stretching and tennis ball exercises are an effective noninvasive treatment for plantar fasciitis, as this case study's findings show.

Conclusion: A patient with plantar fasciitis found that stretching techniques and tennis ball exercises helped reduce discomfort and enhanced functional movement.

Background: Plantar fasciitis is a painful condition resulting from inflammation of the plantar fascia. Patients experience discomfort in the arch of the foot and at the heel tip (calcaneus bone). Plantar fasciitis is a widespread foot condition.

condition that affects approximately 4% to 7% of people and accounts for approximately 15% of foot injuries. It most often occurs in adults aged 40–60 years and among runners. It is responsible for approximately 8% of sport-related injuries. Approximately 83% of patients are working adults between 25 and 65 years of age. Of all foot problems that require medical attention, 11% to 15% are due to plantar

fasciitis, and nearly a third of cases affect both feet simultaneously. Heel pain from this condition typically lasts longer than six months. In the general population, 10%–15% will experience it at some point [1]. The advantage is that nonsurgical treatment resolves symptoms in approximately 90% of patients. Women are affected more often, especially those 45–64 versus 18–44. A BMI > 25 kg/m² is another major risk factor. Restricted ankle dorsiflexion and limited extension of the big toe (1st MTP joint) are factors linked to plantar fasciitis. An excessive range of plantar flexion may also play a role in this condition. [1] [3] The foot's structure is significant. This problem is associated with both high arches (pes cavus) and flat feet (pes planus). Flat feet increase the tension at the area where the plantar fascia connects to the heel, whereas high arches reduce shock absorption and limit foot eversion, resulting in higher stress on the heel. Irregular foot motion during walking or running, whether excessive pronation or supination, may increase stress on the plantar fascia. Lifestyle factors include repetitive high-impact activities, such as extended standing, running, and jumping. Moreover, the use of unsupportive or ill-fitting footwear can worsen the condition. [1][3]

Anatomy of the Sole of the Foot* Fasciae:** 1. ***Superficial fascia of the sole*:** Fibrous and dense fibrous bands behind the skin to the deep fascia or plantar aponeurosis. ***Deep fascia*:** Plantar aponeurosis, deep transverse metatarsal ligament The fibrous flexor sheaths* **Muscles of the Sole – First Layer Flexor digitorum brevis, abductor hallucis, abductor digit I minimize nerve supply → medial plantar nerve, lateral plantar nerve (main plantar/lateral nerve of the trunk) *** Muscles of the Second Layer*** (a) Flexor digitorum longus – Nerve supply: Tibial nerve (b) Flexor digitorum accessorius – Nerve supply: Main trunk of lateral plantar nerve (c) Lumbricals – Nerve supply: Medial plantar nerve (d) Flexor hallucis longus— Nerve supply: Tibial nerve* **Muscle of Third Layer*** (a) Flexor hallucis brevis— Nerve supply: Medial plantar nerve (b) Adductor hallucis – Nerve supply: Lateral plantar nerve (c) Flexor digiti minimi brevis—Nerve supply: Superficial branch of the lateral plantar nerve* **Muscle of Fourth Layer*** (a) Plantar interossei – Nerve supply: First and second lateral plantar nerves (b) Dorsal interossei – Nerve supply: First, second, and third plantar nerves (c) Tibialis posterior – Nerve supply: Tibial nerve (d) Peroneus longus – Nerve supply: Superficial peroneal nerve [2]

The scope of this study was to alleviate pain, enhance foot mobility, and decrease swelling and stiffness. The methods employed in this research included tennis ball exercise and stretching to address pain and improve daily activities in individuals with plantar fasciitis through a combined approach of tennis ball exercise and stretching to reduce pain.

Case Description:

A 47-year-old woman experienced pain at the heel of her left foot when she got out of bed in the morning and after prolonged periods of sitting. The discomfort had persisted for the past month. Pressing on the heel increased pain. Upon examination, there was noticeable swelling and stiffness around the heel and arch of the foot, and the result was plantar fasciitis. The patient was unable to tolerate full body weight during the episodes of pain. The pain worsens when she sits and when she wears high-heeled sandals or slippers. The VAS score is 7/10. The ROM of dorsiflexion was 13°.

Symptoms: Pain:

The sharp pain in the arches of the foot and the heel. The pain is aggravated by prolonged standing and sitting, and it increases in the morning (first-step pain). Pain occurs when standing up after sleeping or sitting down. The pain usually resolves after walking for a few minutes. Heel or foot pain that tends to

worsen after physical activity but is not typically experienced during exercise. Climbing stairs can be particularly painful [4][5]. Stiffness: Stiffness in the foot is common, particularly upon waking up or after a prolonged period of sitting. This stiffness can make it difficult to walk comfortably and may affect functional mobility and ROM. Morning stiffness is also observed in this condition. [4]

Investigation

X-ray and ultrasound Physical assessment: Goniometry → ROM- Pain history: Onset, location

The Windlass test, a numerical pain assessment system, is a reliable factor.

Visual Analog Scale, or VAS, and the Foot Function Index [3][4]

Uniqueness of study:

This case study highlights the advantages of integrating tennis ball exercises with stretching within the conservative physiotherapy management of plantar fasciitis. The principal aim of this combined approach was to reduce pain and restore the patient's functional mobility. Tennis ball exercises were employed to alleviate tension in the plantar fascia and enhance local blood circulation, while stretching exercises targeted improvements in flexibility of the plantar fascia and the calf muscles. Collectively, these modalities contributed to an improved gait, a diminution of morning heel pain, and greater ease in performing daily activities.

Aims of study

A plantar fasciitis case study aims to document the clinical presentation, make an accurate diagnosis, evaluate the outcomes of conservative treatment using the method of tennis ball exercise with stretching, and provide evidence for effective physiotherapy care.

Objective of study

This study's main objective is to evaluate the effect of physiotherapy management in reducing pain and improving functional ability with the help of tennis ball exercises with stretching in a patient with plantar fasciitis.

Intervention:-



- 1. Stretching:** You should do stretching that includes the plantar fascia, the Achilles tendon, and the calf muscles. When you do plantar fascia stretching, you need to cross the leg that hurts over the other leg. Then you use your fingers to grab the base of your toes and pull them back until you feel the stretch in the plantar fascia. You have to hold this stretch for 10 to 20 seconds and do it 10 times. When you

do Achilles tendon stretching, you stand up. Put the leg that hurts behind the other leg with your toes pointing forward. You bend the knee but keep the back knee straight and your heel on the ground. If you want to stretch the soleus muscle, you slightly bend the knee. For the wall calf stretch, you stand up straight facing a wall, about an arm's length from it. You take a step forward with the leg that does not hurt and put your hands on the wall. Then you straighten the knee of the leg that hurts. Keep your heel flat on the floor. You lean your body toward the wall until you feel the stretch in the calf and the Achilles tendon. You are stretching the calf and the Achilles tendon when you do this. [4]

2. ***Tennis Ball Exercise*** The patient sits on a chair. Rolling a tennis ball under the foot provides a massage effect and applies pressure to specific points, which can help release tension in the muscles, ligaments, and fascia of the foot. Plantar fasciitis is a common cause of foot pain. Rolling a tennis ball under the foot can help stretch and massage the plantar fascia, providing relief from pain and stiffness and stimulating blood flow. Massaging the foot with a tennis ball can help increase blood circulation, which can promote healing and reduce inflammation in the affected area. Regularly rolling a tennis ball under the foot can help improve flexibility and range of motion, which can reduce stiffness and discomfort associated with certain foot conditions. [4][5]

Uniqueness of study

This case study demonstrates the benefit of combining tennis ball exercise with stretching in the conservative physiotherapy treatment of plantar fasciitis. Reducing pain and restoring the patient's functional mobility were the main goals of this combination strategy.

Results

After undergoing physiotherapy treatment that included a combination of tennis ball exercises and stretching techniques, the patient experienced a noticeable reduction in symptoms, with only mild pain reported during the morning. The Visual Analog Scale (VAS) score improved from 7/10 to 3/10, while ankle dorsiflexion increased from 13° to 18°.

Outcome measure	Pre-treatment	Post-treatment
VAS pain score	7/10	3/10
Ankle Dorsiflexion	13°	18°

Discussion

The results of this case study demonstrate that stretching and tennis ball exercises are a successful non-invasive treatment for plantar fasciitis. This method improves the flexibility of the calf muscles and plantar fascia while reducing pain. According to research, people with plantar fasciitis can improve their function and experience less heel discomfort by using conservative physical therapy techniques. This patient's notable improvement indicates that stretching exercises combined with tennis ball therapy can assist in speeding up recuperation and increasing general mobility. [1][3][4][5]

Conclusion

A patient with plantar fasciitis found that stretching techniques and tennis ball exercises helped reduce discomfort and enhance functional movement. The patient's ability to do daily duties, walking efficiency,

and joint flexibility all significantly improved after four weeks of physical treatment. [5][4]

Reference

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