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**EFFECTIVENESS OF KINETIC CHAIN RELEASE ON PAIN AND
FUNCTION AMONG INDIVIDUALS WITH PLANTAR FASCIITIS: AN
EXPERIMENTAL PILOT STUDY**

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ABSTRACT

Aim: The aim of the study is to evaluate the effect of kinetic chain release on pain and function among individuals with plantar fasciitis.

Background: Heel pain is a common presenting complaint in the foot and ankle practice, and plantar fasciitis (PF) is the most common cause of chronic pain beneath the heel in adults, making up 11–15% of the foot symptoms requiring professional care among adults. It is estimated that 1 in 10 people will develop PF during their lifetime.

Methodology: 20 Subjects with plantar fasciitis participated in the experiment study underwent treatment duration for 2 weeks after giving their informed consent. they were evaluated and randomize into experimental group receiving posterior kinetic chain release and soft tissue mobilisation, stretching along with ultra- sound therapy and basic ankle exercise. The pre and post values of vas and FADI score were recorded at start of the treatment and consequently after the end of treatment.

Conclusion: posterior kinetic chain release along with stretching were found to be more effective in improving foot and ankle functional disability. posterior kinetic chain release using with foam roller and soft tissue mobilisation shows better result in improving in plantar fasciitis.

Keywords: plantar fasciitis, posterior kinetic chain release, vas, FADI score, foam roller, soft tissue mobilisation, Plantar fascia, hamstring muscle, calf muscle, gastrocnemius muscle

INTRODUCTION

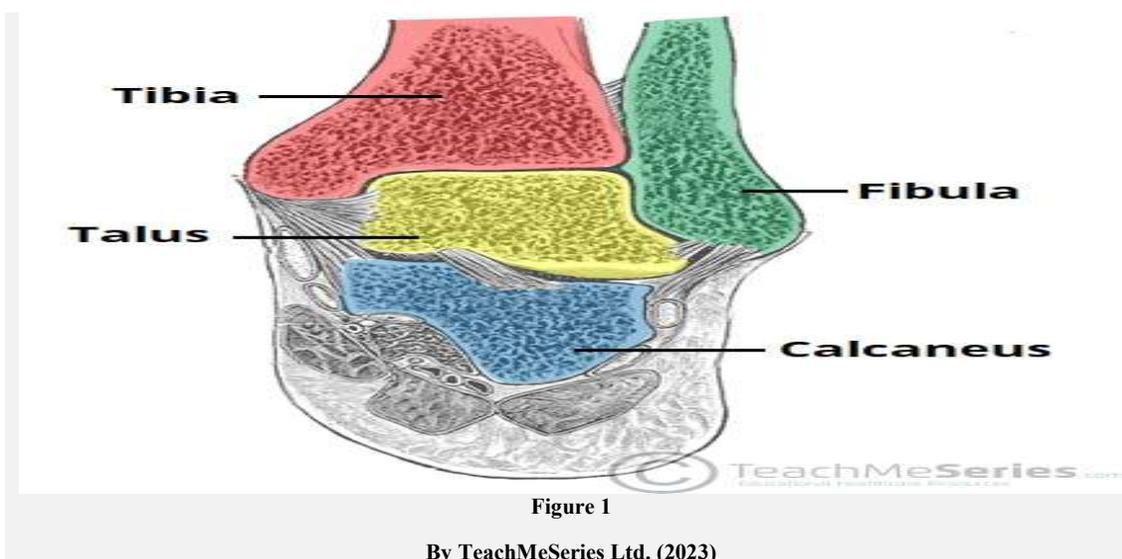
In the foot and ankle clinic, heel pain is a frequently encountered presenting complaint. Plantar fasciitis (PF) accounts for 11–15% of adult foot complaints that require medical attention and is the most common cause of chronic discomfort beneath the heel [1-4]. One in ten persons are predicted to acquire PF at some point in their lives [5]. Athletic populations are more likely to have PF, which is more prevalent in middle-aged obese females and young male athletes, while not all cases need medical attention. Runner's heel, calcaneal periostitis, heel

spur syndrome, painful heel syndrome, and chronic plantar heel discomfort are some names for PF in the literature [6, 7].

A synovial joint in the lower limb is the ankle joint, also known as the talocrural joint. The tibia and fibula of the leg and the talus of the foot combine to make it.

It is a hinge-type joint that allows the foot to move in both dorsiflexion and plantar flexion.

We will examine the articulating surfaces, ligaments, motions, and clinical correlates of the ankle joint in this article.



Adaptable surfaces

3 bones make up the ankle joint: the talus of the foot, the tibia and fibula of the leg, and robust tibiofibular ligaments hold the tibia and fibula together. They come together to form a socket with a bracket shape and hyaline cartilage covering it. A mortise is the name for this socket. The talus's body slides comfortably into the groove created by the

leg's bones. The talus's articulating portion has a wedge-shaped; it is wide in front and thin in back.

Dorsi flexion – the anterior part of the talus is held in the mortise, and the joint is more stable.

Plantar flexion- the posterior part of the talus is held in the mortise, and the joint is less stable [10].

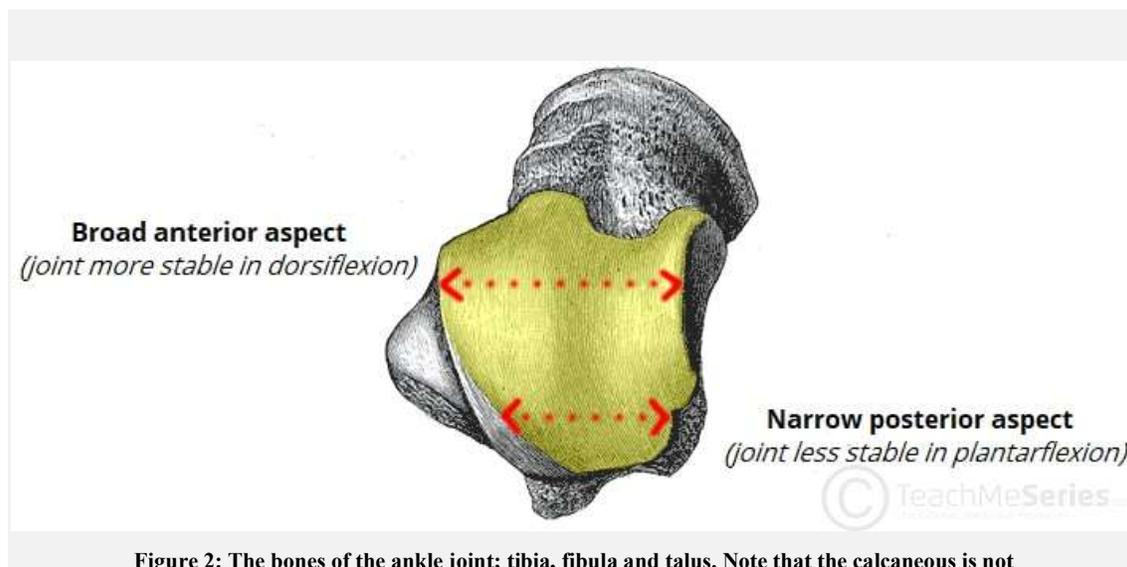


Figure 2: The bones of the ankle joint; tibia, fibula and talus. Note that the calcaneus is not

Lateral Ligament

Every malleolus is the source of two primary groups of ligaments.

Ligamentous Medial

The medial malleolus, a bony protrusion that extends from the medial aspect of the distal tibia, is where the medial ligament, also known as the deltoid ligament, is attached.

It is made up of four ligaments that branch off of the malleolus and join the navicular, talus, and calcaneus bones. The medial ligament's main function is to prevent the foot from being overly everted.

The lateral malleolus, a bony protrusion extending from the lateral face of the distal fibula, is the source of the lateral ligament.

Three different and separate ligaments make up this structure, which prevents the foot from being overly inverted:

- Anterior talofibular: connects the lateral side of the talus to the lateral malleolus.
- Posterior talofibular: connects the posterior part of the talus to the lateral malleolus.
- Calcaneofibular: connects the calcaneus to the lateral malleolus [10].

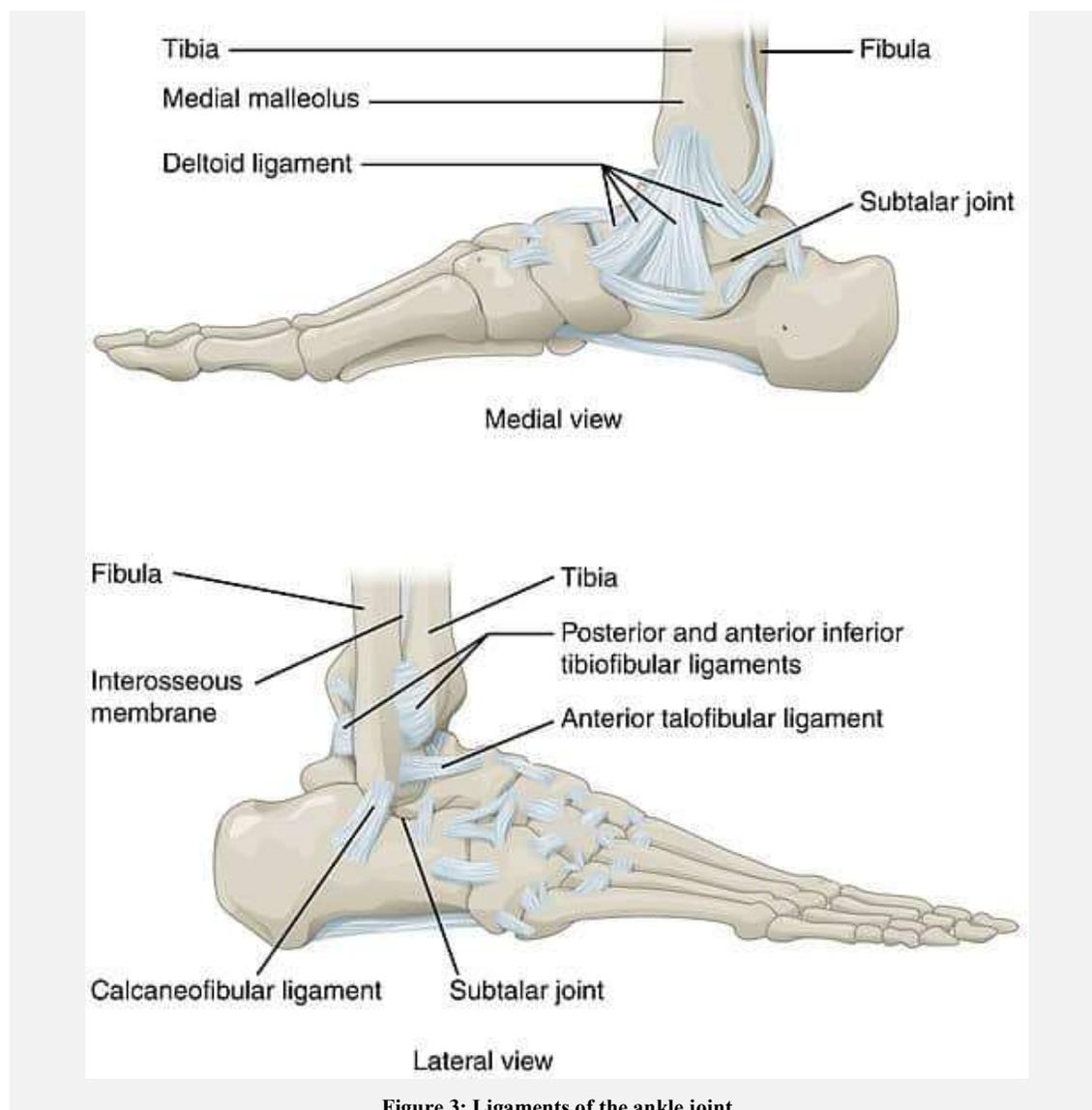


Figure 3: Ligaments of the ankle joint

Movements and Muscles Involved

The ankle joint is a **hinge type joint**, with movement permitted in one plane.

Thus, plantarflexion and dorsiflexion are the main movements that occur at the ankle joint. Eversion and inversion are produced at the other joints of the foot, such as the **subtalar joint**.

Plantarflexion – produced by the muscles in the posterior compartment of the

leg (gastrocnemius, soleus, plantaris and posterior tibialis).

Dorsiflexion – produced by the muscles in the anterior compartment of the leg (tibialis anterior, extensor hallucis longus and extensor digitorum longus).

Neurovascular Supply

The **arterial supply** to the ankle joint is derived from the malleolar branches of the

anterior tibial, posterior tibial and fibular arteries.

Innervation is provided by tibial, superficial fibular and deep fibular nerves [9].

Patho-anatomical features:

Understanding the local anatomy comes before making a differential diagnosis for PF. Shock-absorbing, fully honeycombed fibro-fatty fat pad separates the calcaneum from the plantar surface.

There are medial and lateral processes on the calcaneum's posterior tuberosity. Along with the central band of plantar fascia, the medial process provides attachment to the Abductor hallucis (AH), the medial head of Quadratus plantae (QP), and the Flexor digitorum brevis (FDB).

The calcaneum, an enthesis, has a direct fibrocartilaginous connection to the plantar fascia, also known as the deep fascia of the sole, proximally. The calcaneum's central band, together with its medial and lateral bands, are constant. The triangular structure originates from the medial process of the calcaneal tuberosity and splits into five distinct strands at the mid-metatarsal level. These strands are connected to the plantar skin at the forefoot, the plantar plate at the base of the proximal phalanges, the collateral ligaments at the metatarsophalangeal (MTP) joints, and the deep transverse ligament at the metatarsophalangeal joints [6].

Heel skin is innervated by the medial calcaneal nerve which may present with heel pain if compressed proximally (such as in tarsal tunnel syndrome). Boxter's nerve (the first branch of lateral plantar nerve) may be at risk of compression between AH and medial belly of the QP muscle [6, 8].

Kinetic chain release:

In related groups of body segments connecting joints, muscle working together to perform movements and the portion of the spine to which they connect.

The spiral (oblique) chain

The lateral chain

Posterior sagittal chain

Posterior oblique chain

Anterior sagittal chain

Deep anterior chain

METHODOLOGY

Source of Data: Parul Sevashram Hospital, Parul University

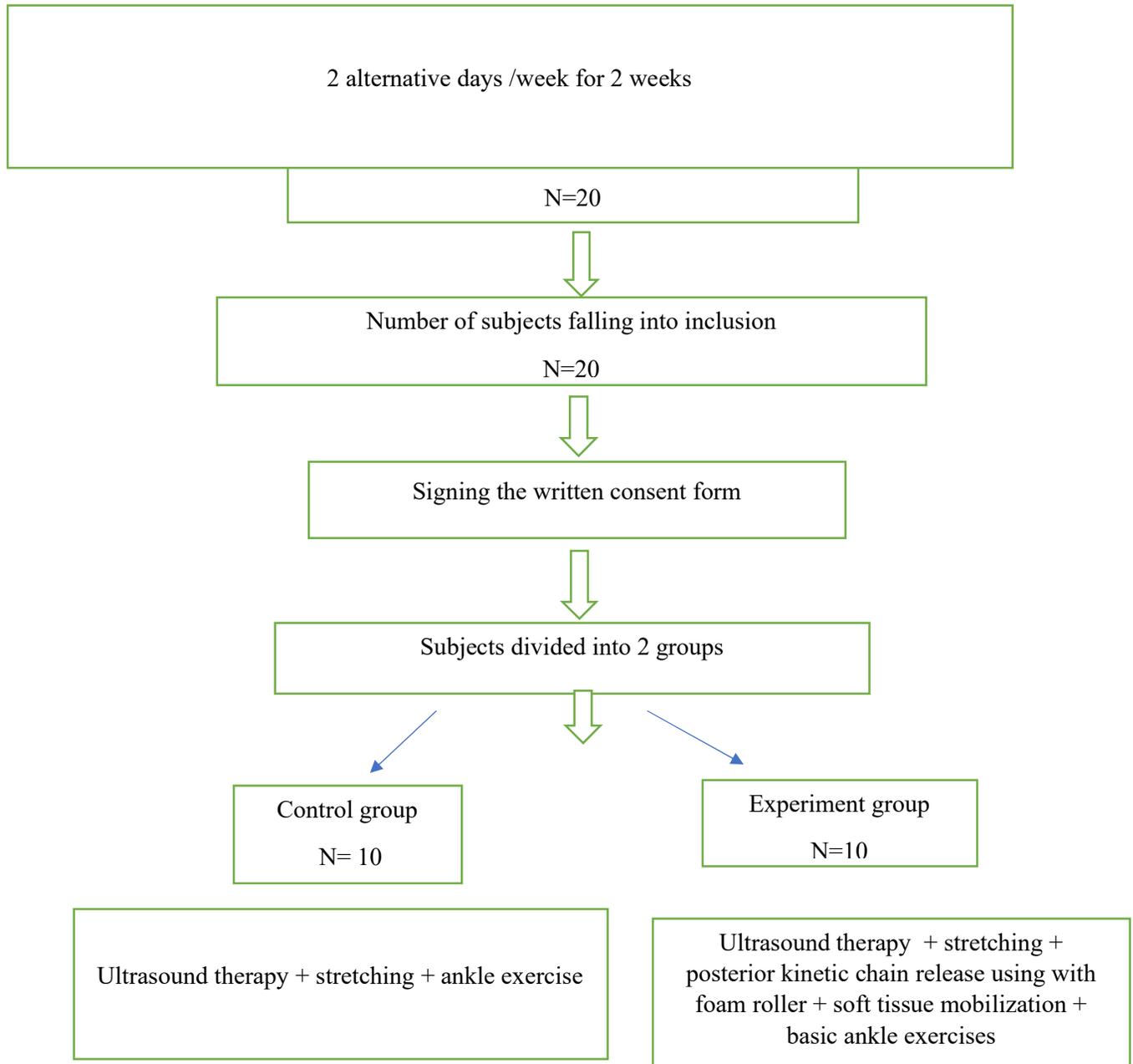
Sample Size: Total number of Population(N)= 20

Selection Sample: Random sampling

Study Design: An Experimental study

Study Duration: 2 week

Intervention Duration: 2 alternative days per week.



MATERIAL AND METHOD

Materials used:

Pen

Pencil

Scale

Eraser

Paper

FADI scale

Vas scale

Foam roller

Towel

Physiotherapy ball

Procedure:

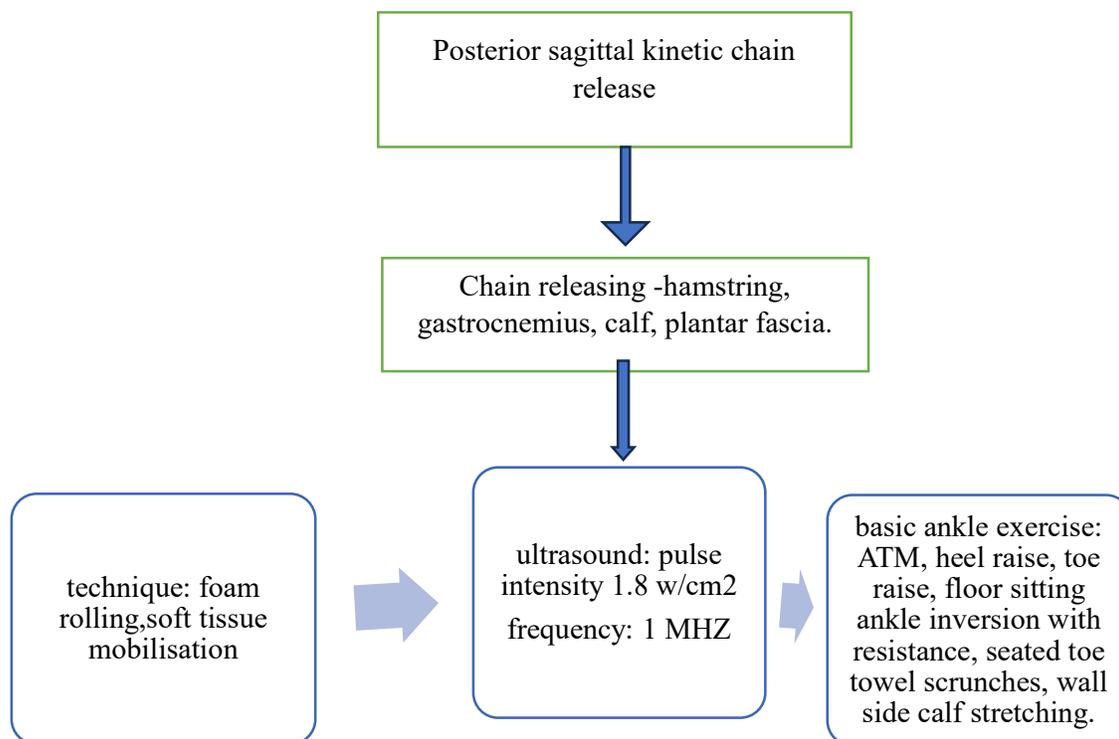
The study conducted normal among individual between 20 to 60 years of age to find the effect of kinetic chain release by manual using with foam roller combined with stretching and basic ankle exercises for plantar fasciitis.

20 subjects with the plantar fasciitis were screened for study. inclusion criteria were included Participants of both genders (control and experiment group) will be included Subjects who will sign consent form willingly. Participants who can understand Hindi, Gujrati and English. Participants with unilateral and B/L planter fasciitis will be included for the study.

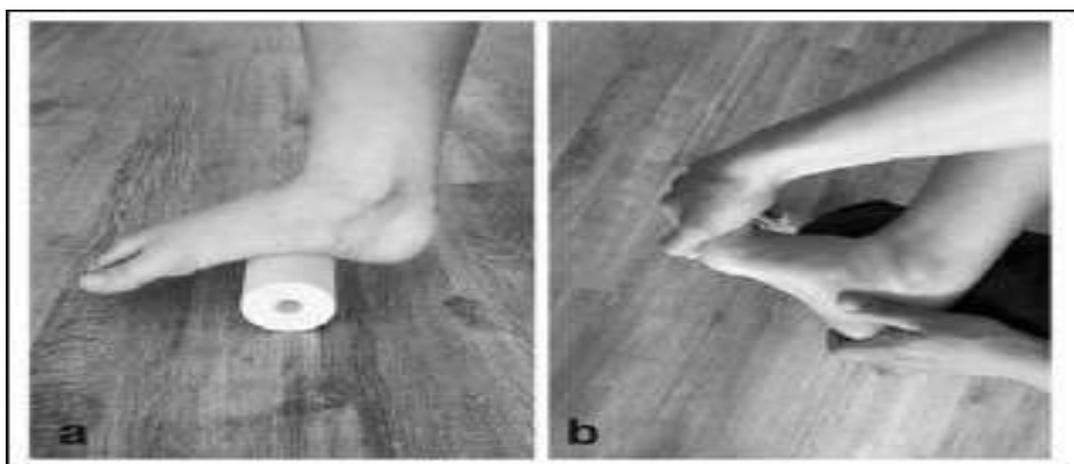
Each individual was then asked to sign the written consent form. Once the consent form was signed, each participants were made to perform plantar fasciitis exercise protocol and they all under supervision and all the participants were assessed pre and postintervention for VISUAL ANALOUG SCALE and FOOT AND ANKLE DISABILITY INDEX. Total no. of dropouts was zero.

Participants divided into 2 group which one male and second is female. Participants were divided in each group is 10- 10.

The intervention is as mentioned below:



All exercises are done by 3 times continuous 10 rep 2 sets for 2 weeks.



STATISTICAL ANALYSIS

Statistical analysis was performed with SPSS program version 27 for the statistic. The Wilcoxon test determine for VAS and FADI scale pre and post treatment. the significance level was set at $p \leq 0.05$.

RESULTS

Twenty people in all finished the study and were taken into account for the analysis.

Group 1 (mean $30.2 \pm SD$) and group 2 (mean $33.6 \pm SD$) of the participants' baseline data were as follows: mean age between 20 and 60. and they were split into two groups at random. Six females and four males made up Group 1, while six females and four men made up Group 2.

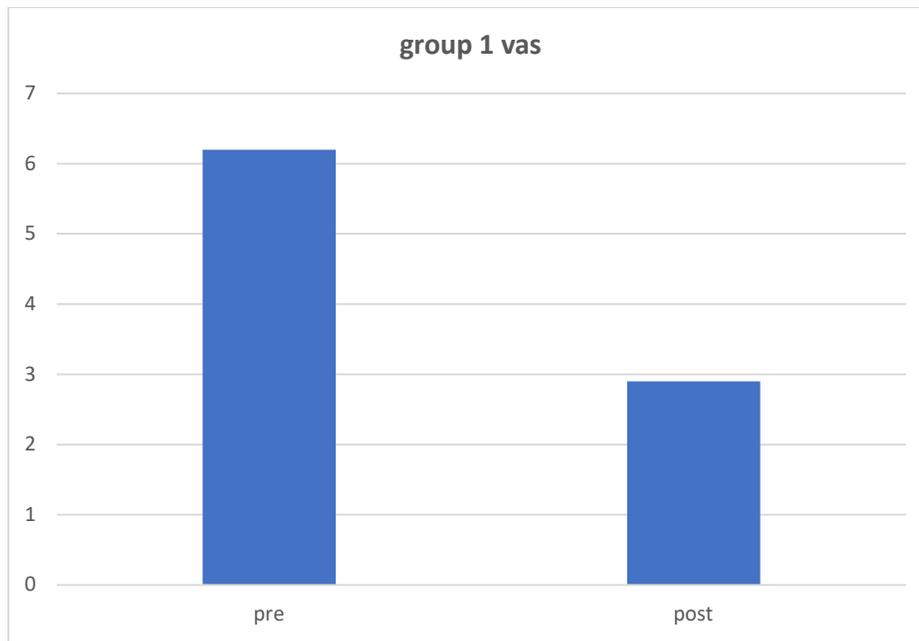
Table 1: Baseline Data Distribution

No	Training group	Sample size	age	gender
1	Group 1	10	30.2	6 females, 4 males
2	Group 2	10	33.6	6 females, 4 males

Table 2: Group 1 Pre and Post Within Vas Group

group	mean	SD	Z value	P value
pre	6.2	0.78	-2.8	0.04
post	2.9	0.87	-2.8	0.05

Table 2, shows the vas group 1 pre mean \pm SD value is 6.2 ± 0.78 and z value -2.8, so p significant value is 0.004. and vas group 2 post mean \pm SD value is 2.9 ± 0.87 and z value -2.8, so p significant value is 0.005. so vas scale more significant for pre assessment for this study.



Group 1 FADI pre and post

group	mean	SD	Z value	P value
pre	65.1	0.78	-2.8	0.04
post	80	0.87	-2.8	0.05

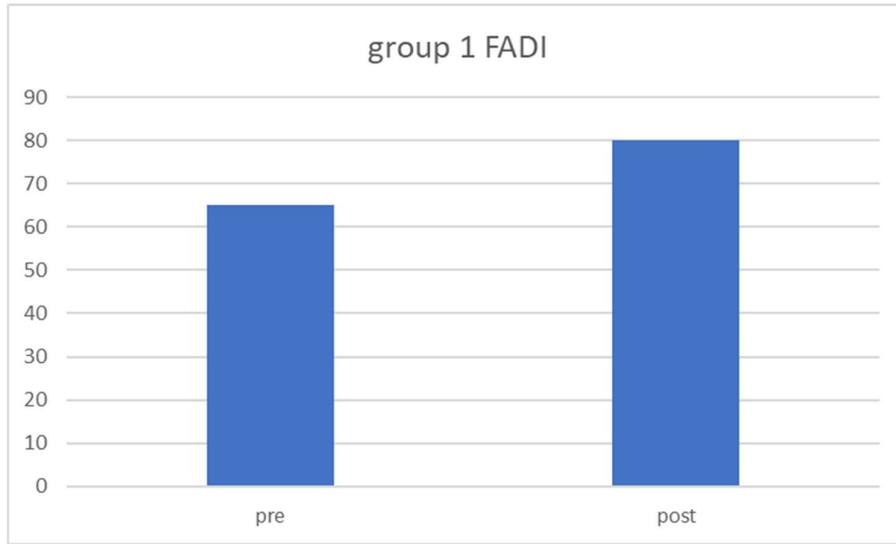
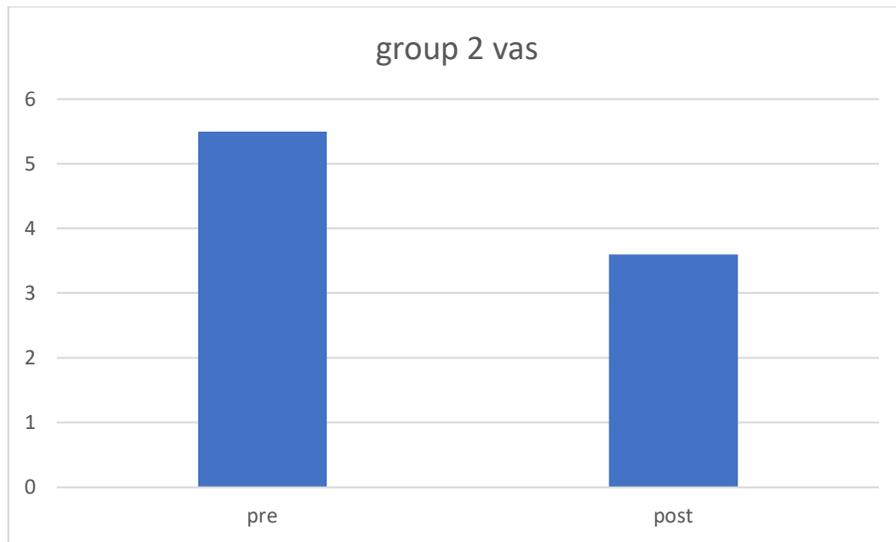


Table shows the group 1 FADI pre mean \pm SD value is 65.1 ± 0.78 , and z value is -2.8 so p significant value is 0.004 and post mean \pm SD value is 80 ± 0.87 z value is -2.8 and p value is 0.005 so graph shows the fadi scale more significant for this study.

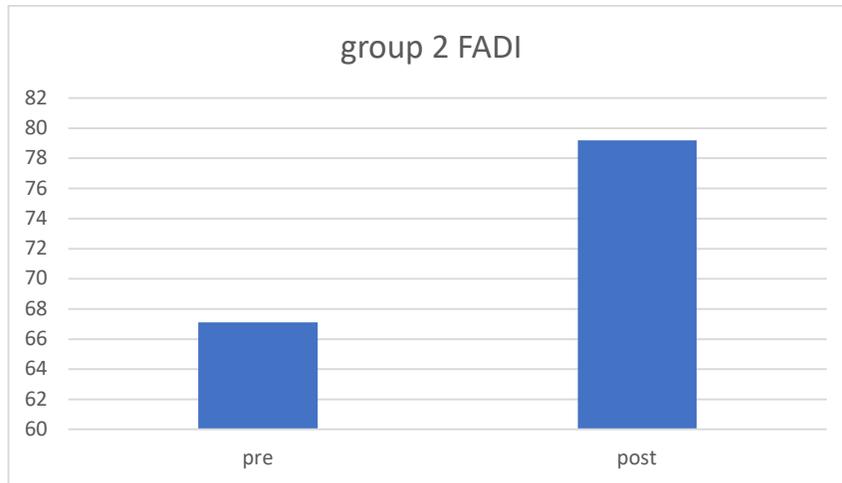
Group 2 vas pre and post

Group	mean	SD	Z value	P value
pre	5.5	1.43	-2.8	0.005
post	3.6	1.57	-2.8	0.005

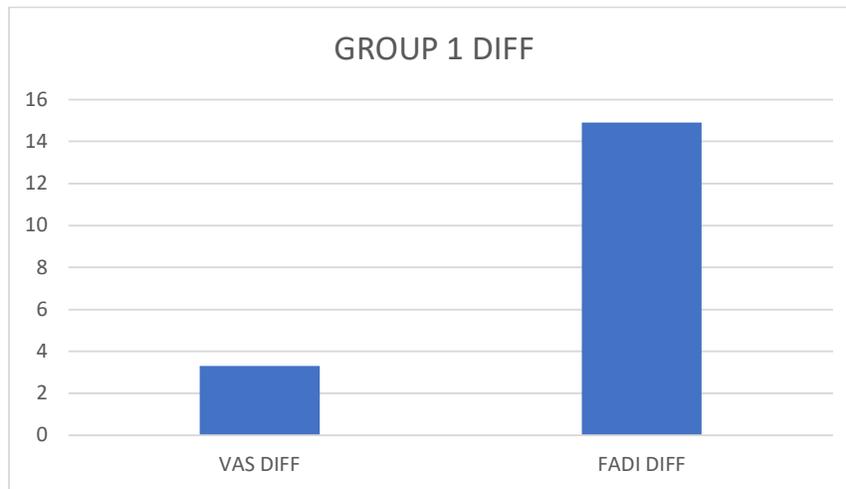


Group 2 FADI pre and post

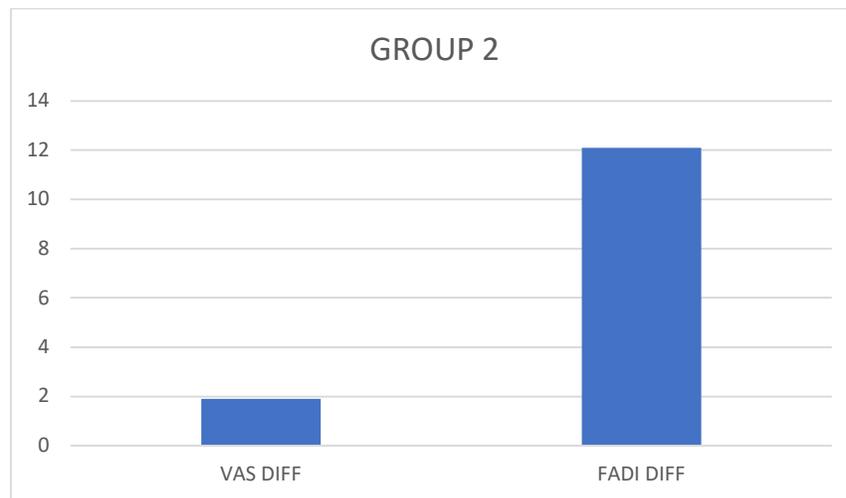
group	mean	SD	Z value	P value
pre	67.1	7.88	-2.8	0.005
post	79.2	6.54	-2.8	0.005



GROUP 1 WITHIN GROUP VAS AND FADI DIFFERENCE



GROUP 2 WITHIN GROUP VAS AND FADI DIFFERENCE



According to this study, plantar fasciitis is more common in the 35–40 age range, Vas scale is more useful for to measure the pain for pre and post assessment for kinetic chain release therapy and for foot function measures the FADI scale is more beneficial for kinetic chain release therapy for plantar fasciitis. For this investigation, the P value of 0.005 is significant. A foam roller is a more efficient tool for relieving pain and muscle spasm. In this study, the experimental group benefited from soft tissue mobilization as well. For plantar fasciitis, the kinetic chain release approach proved to be more successful.

DISCUSSION

The purpose of the research was to determine how kinetic chain release affected the pain and function of people with plantar fasciitis. There were perhaps 20 participants in total that were screened for the study. Twenty subjects were chosen based on inclusion and exclusion criteria. which subjects provided their consent to be included in the study. All of the participants were required to undertake simple ankle exercises to treat plantar fasciitis. Following a two-week training regimen, post-VAS was used to quantify pain, and FADI was utilized to test foot function [13-15].

The effectiveness of Transverse Friction Massage and Self Myofascial Release Therapy in Improving Hamstring Flexibility in Desk Job Workers was examined in a

previous study by Mansi Gala, Parag Kulkarni, Ajay Kumar, *et al.* (2021). The results indicate that both therapies are effective in improving hamstring flexibility in desk job workers when they target the plantar fascia via the anatomy trains. Both statistically and clinically, self-myofascial release therapy outperformed transverse friction massage therapy [16].

The current study demonstrates a significant improvement in plantar fasciitis patients' foot discomfort and function following therapy with foam rollers, soft tissue mobilization techniques, basic ankle exercises, and stretching. The mean difference between the pre- and post-assessments indicates this.

The conclusion that there is a significant difference in the variable of interest between the pre and post values of vas and FADI is supported by the p-value of 0.05, which offers strong evidence to reject the null hypothesis. These results add important information to our understanding of how to treat plantar fasciitis in normal individuals by using a foam roller, posterior kinetic chain release, stretching, and simple ankle exercises to relax the plantar fascia and muscles. These treatments all effectively reduce pain and improve foot function [17-20].

CONCLUSION

Stretching and posterior kinetic chain release were found to work better together to

improve functional impairment in the feet and ankles. Plantar fasciitis improves more when posterior kinetic chain release combined with foam roller therapy and soft tissue mobilization is used.

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