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A Study to Compare Effectiveness of Myofascial Release Versus Foam Roller on Decreasing Pain and Improving Dorsiflexion Range of Motion of Ankle Joint in Patients with Plantar Fascitis: A Randomised Control Trial

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Abstract:

- ***Background:***

Plantar fasciitis is defined as a localized inflammation and degeneration of the proximal plantar heel pain, it represents as soreness or tenderness of the heel that is restricted to the sole of the foot. The fascia supports the medial longitudinal arch of the foot, aids in the gait cycle, and makes it easier to absorb shock when engaging in weight-bearing activities. Plantar fasciitis causes stabbing pain, which is especially severe with the initial steps in the morning. As the range of ankle dorsiflexion decreases, the risk of plantar fasciitis increases. While the estimated lifetime incidence of PF is 10%. However, about 90% of patients with plantar fasciitis benefit from nonsurgical treatment. Myofascial release, or MFR, is a famous manual therapy technique that manipulates the myofascial complex using precisely guided low load, long duration mechanical stresses with the goals of restoring appropriate length, reducing pain, and improving function (Barnes, 1990). Foam roller is a popular device commonly used in sports and physical therapy. Using a foam roller can lessen muscle soreness, increase neuromuscular efficiency, and improve sprint performance. Foam rollers and roller massagers are often employed tools to promote myofascial mobility.

- ***Objective:***

To compare the effectiveness of myofascial release versus foam roller in decreasing pain and improving range of motion in patients with plantar fasciitis.

- ***Methodology:***

60 subjects with plantar fasciitis were selected in accordance with inclusion and exclusion criteria. Baseline assessment was taken (FFI, VAS, and ROM). The intervention (Group 1: myofascial release and Group 2: Foam roller) was given for 3 times a week for 4 weeks. At the end of 4 weeks outcome measures where checked for all the subjects.

- ***Results:***

The baseline characteristics age, gender, affected side along with VAS, ROM, and FFI have been calculated. Pre and post outcome scores showed statistical significance difference ($p<0.001$) between both the groups, while Group 1 (Myofascial Release) was better in all outcome measures as compared to Group 2 (Foam roller).

- ***Conclusion:***

While both foam roller and myofascial release techniques are effective in treating plantar fasciitis, myofascial release is more effective in terms of decreasing pain and improving functional abilities.

Keywords: *QOL– Quality of Life, PF – Plantar Fasciitis, MFR – Myofascial Release, VAS – Visual Analogue Scale, ADL – Activities of Daily Living, FM – Foam Roller, ROM- Range of Motion, MTrP- Myofascial Trigger Point Release, DF-Dorsiflexion.*

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I. INTRODUCTION

Plantar fasciitis is defined as a localized inflammation and degeneration of the proximal plantar heel pain, also known as plantar fasciitis, is soreness or tenderness of the heel that is restricted to the sole of the foot.[1]

In order to support the arch of the foot and serve as a shock absorber for pressure applied to the foot, the plantar fascia is a band of connective tissue that begins at the calcaneus and inserts on the tendons of the forefoot and proximal phalanges. Plantar fasciitis is not the primary inflammatory process Rather, it is a degeneration of the plantar fascia caused by recurrent micro tears in the fascia that trigger an inflammatory response.[2] Plantar fascia supports the medial longitudinal arch of the foot, aids in the gait cycle, and makes it easier to absorb shock when engaging in weight-bearing activities[3]. Poor biomechanics, like excessive pronation, have been linked in the literature to plantar fasciitis. In an excessively pronated gait, structural malformations like forefoot varus can be the cause. In addition to increasing tissue tension and plantar fascial elongation, over pronation also leads to excessive foot movement, which can exacerbate the strains placed on the musculofascial and soft tissue structures. Therefore, people with different foot types experience plantar fascia pain resulting from different biomechanical stresses.[4] However, it is believed that there are other contributing factors to plantar fasciitis, including faulty biomechanics and delayed healing.[5]

Plantar fasciitis causes stabbing pain, which is especially severe with the initial steps in the morning. Fasciitis discomfort often subsides with standing and walking activities, but it may resurface after extended standing or after rising from a seated position.[6] this is because the foot often assumes a plantar flexed position at night, and when a patient gets out of bed in the morning, the foot assumes a dorsiflexed position when walking. In bed, the plantar fascia gradually contracts, and the initial stretching that comes with waking up early in the morning is probably what causes the initial soreness.[7] Plantar fasciitis is more likely to occur in older people (usually between the ages of 40 and 60) in female gender, certain exercises (like long-distance running, ballet dancing, and dance aerobics) that put high level of strain on the heel and attached tissue, poor foot mechanics (such as flat feet, high arches, or an abnormal walking pattern), obesity, jobs requiring a lot of standing, and inappropriate footwear (such as shoes with thin soles, loose fitting, high heels, or no arch support)[6] and tightness in the intrinsic foot muscles and Achilles tendon[8] · As the range of ankle dorsiflexion decreases, the risk of plantar fasciitis increases[9]. Because it showed that dorsiflexion of the toes hardens the plantar fascia enhances the influence of a tensile force in the tendoachilles on the tensile strain and tensile force in the plantar fascia.[10]

With an estimated prevalence of 7% in adults over 65, it is most prevalent in middle-aged and older adults. While the estimated lifetime incidence of the condition is 10%, more than 10% of adult foot symptoms requiring medical attention are thought to be caused by plantar fasciitis[9]. However, about 90% of patients with plantar fasciitis benefit from nonsurgical treatment[11]. Regarding the association between sex and plantar fasciitis, the available research is inconsistent. [12]

Myofascial release (MFR) is a method of treatment that integrates the concepts and approaches of cranio-sacral, intrinsic force, and soft tissue techniques. It includes a highly subjective energy transfer from the therapist to the patient [13]. The definition of myofascial therapy is "facilitation of mechanical, neurological and psycho physiological adaptation potential as interfaced by the myofascial system". Fascia is a continuous network of connective tissue that covers and connects the muscles, organs, and skeletal systems in our body. It is found between the skin and the underlying structure of muscle and bone. The muscle and fascia are the components of myofascial system[14] · Myofascial release, or MFR, is a famous manual therapy technique that manipulates the myofascial complex using precisely guided low load, long duration mechanical stresses with the goals of restoring appropriate length, reducing pain, and improving function (Barnes, 1990). MFR is said to be useful in delivering prompt pain and tissue tenderness easing when combined with traditional treatment [15.] The goal of the direct MFR approach is to increase soft tissue mobility by using gradual fingers, thumbs, forearms, or elbows to apply regulated mechanical stress directly into a limitation. The amount of pressure is progressively increased or applied repeatedly until the tissue's mobility is perceived to improve [16]

Foam roller is a popular device commonly used in sports and physical therapy[17] .Athletes and fitness enthusiasts have been using foam rollers more frequently during the past ten years. It had grown to such a degree of popularity that it was named the Global fitness trend ranking 14th in popularity in the year 2019. Through manual pressure, therapeutic treatments for fascia claim to change the density, tonus, viscosity, or arrangement of individual fibres[18] ·Additionally, using a foam roller can lessen muscle soreness, increase neuromuscular efficiency, and improve sprint performance[17]. Foam roller has been the subject of recent and ongoing research. It has also been demonstrated to possibly lessen stiffness and the pain brought on by delayed onset muscle soreness. Foam roller is well-respected in the fields of rehabilitation and strength and conditioning for promoting healing and extending joint range of motion.[19]

II. MATERIALS AND METHODS

A 12-month experimental study design was employed, with pre- and post-study designs. In this study, 60 individuals

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were included and divided into two groups. The sample was collected from Physiotherapy outpatient Department of Narayana Orthopaedic Spine and Trauma Center, Narayana Health City, Bangalore. Ethical clearance was obtained from Ethical Committee of Narayana Hrudayalaya under DHR with registration number: EC/NEW/INST/2022/KA/0123. Study is also registered in CTRI: CTRI/2023/12/060619. Informed consent was taken from 60 participants who fulfilled the inclusion criteria. Baseline assessment was done before the commencement of the protocol. Then the participants were allocated to one of the two groups according to the inclusion criteria, either Group 1 (myofascial release with conventional therapy) Or Group 2 (foam roller with conventional therapy) both the techniques were given three times in a week for a duration of 4 weeks. All the participants had undergone measurements for three times with an interval of pre-test at 0^{th} week and post-test at 4^{th} week.

➢ *Inclusion Criteria:*

The sample included in the study were patients who are having a history of prolonged standing, both genders (male and female) were included in the study, age above 18 years having sharp acute pain on the first step in the morning, both unilateral and bilateral diagnosis and clinical presentation are included.

➢ *Exclusion Criteria*

Samples excluded from this study were patients who have undergone prior orthopaedic surgery, Subjects with calcaneal spur, subjects with systemic disorders, Subjects with neurological disorder/ musculoskeletal disorders, Fractures in and around ankle joint.

➢ *Outcome Measure:*

- Visual Analogue scale for pain
- Goniometer to assess dorsiflexion range of motion
- Foot Functional Index for improving foot function

➢ *Intervention*

- *Group 1*

Myofascial Release technique for 20 repetitions was given along with stretching, ultrasound therapy and muscle strengthening. Stretching was given for 30 sec hold for 3 times.

- *Group 2*

Foam roller technique along with stretching, ultrasound therapy and muscle strengthening.

➢ *Myofascial Release Technique*

Fig 1 MFR Application to Superficial Layer of Plantar Fasciitis

- The therapist sat in front of the patient's leg while the patient lay supine. When MFR was applied, the ankle was dorsiflexed. The therapist positioned the dorsum of her hand in a concave posture. The dorsal portion of the hand was used to apply MFR, and pressure was administered over the superficial layer by sliding from the area that was affected towards the calcaneus.

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Fig 2 MFR Application to the Plantar Surface using Thumb

- The therapist sat in front of the patient's leg while the patient lay supine. When MFR was applied, the ankle was dorsiflexed. Using her thumb, the therapist applied pressure on the superficial layer by moving from the afflicted area towards the calcaneus.

Fig 3 MFR application to Gastrocnemius muscle

- Stretching was done for the gastrocnemius muscle where the patient was lying prone and the therapist stood at the patient's leg. The therapist used both thumbs to apply MFR over the gastrocnemius muscle.

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14849340

➢ *Foam Roller Technique*

Fig 4 Illustration of SMFR Technique with Foam Roller

The therapist stood in front of the patient, who was standing. Foam roller was placed under the patients sole and asked the patient to apply pressure until the patient feel discomfort and not pain and asked to roll the roller towards the calcaneus for 5 min.

III. STATISTICAL ANALYSIS

Descriptive and inferential statistical analysis has been carried out in the present study. Data was analysed using SPSS version 27 software and R- programming version 4.3.1.

Shapiro-Wilk Test was used to test the Normality of the Data. Based on the normality of the data. A- Paired T- test was used to compare the before and after change within the group.

An Independent T- test was used to compare the Mean between two groups based on the normality of the data. A p-value of <0.05 was considered as statistically significant.

IV. RESULTS

Comparing the Pre-Test and Post-Test Results within the Groups Table 1.

Table 1 The mean Difference within the Pre and Post-Test of all the Outcome Measures (VAS, FFI, and ROM) was Assessed.

		Mean	Std. Deviation	Mean Difference	t	P- value
	E-POST-ANKLE ROM (DF)	16.53	1.106	4.8	26.382	<0.001*
	E-PRE-ANKLE ROM (DF)	11.73	1.285			

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	E-POST-FFI	39.53	6.637	-12.2	-17.584	<0.001*
	E-PRE-FFI	51.73	5.330			
	E-POST-VAS	2.43	.935	-3.37	-19.874	<0.001*
	E-PRE-VAS	5.80	1.126			
	C-POST-ROM(DF)	15.63	1.377	3.4	16.018	<0.001*
	C-PRE-ROM(DF)	12.23	1.851			
	C-POST-FFI	44.27	4.234	-10.7	-20.110	<0.001*
	C-PRE-FFI	54.97	4.140			
	C-POST-VAS	3.13	1.224	-2.5	-13.577	<0.001*
	C-PRE-VAS	5.63	1.129			

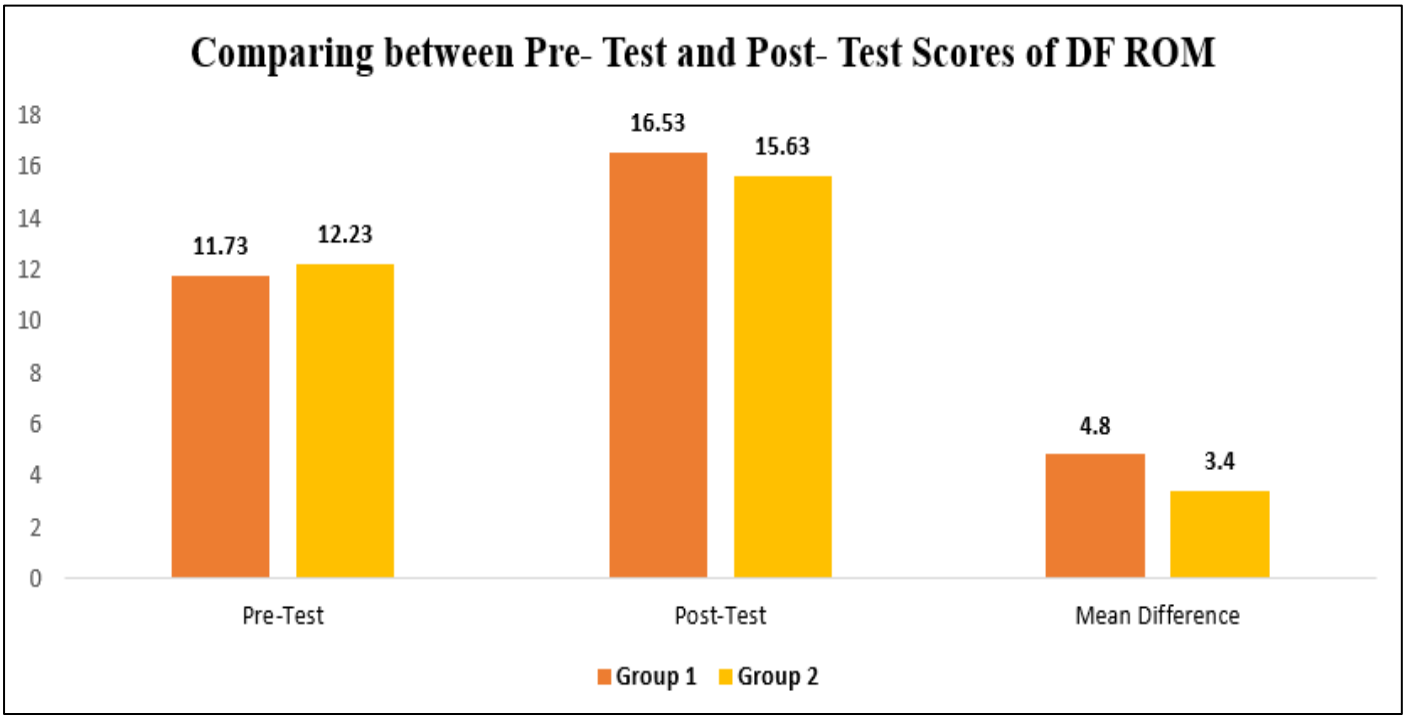
Statistical Test: Paired T- Test; P-Value<0.05-Significant*

➢ *Interpretation*

The mean and SD of pre-test ankle (DF) range of motion for experimental group was 11.73±1.285 and post-test was 16.53±1.106 with the t- value of 26.382 at the end of 4 weeks duration. This result shows that there is a significant increasing in range of motion which is statistically significant (p<0.001). The mean and standard deviation of FFI (pre-test) for experimental group was 51.73±5.330 and post-test was 39.53±6.637 with t- value of -17.584. This result shows that there is a significant decrease in disability at the end of 4 weeks duration which is statistically significant (p<0.001). The mean score of pre-test VAS for experimental group was 5.80±1.123 which has decreased to 2.43±0.935 with the t-value of -19.874 at the End of 4 weeks duration. This result shows that there is a significant decrease in pain which is statistically significant (p<0.001).

In control group the mean and SD of pre-test for ankle (DF) ROM was 12.23±1.851 and post- test was 15.63±1.377 with t- value of 16.018. There is a significant increase in ROM which is proven as statistically significant (p<0.001).the mean and SD for FFI (pre-test) was 54.97±4.140 and post-test was 44.27±4.234 with t- value of -20.110. This result shows that there is a significant decrease in disability at the end of 4 weeks. And is proven statistically significant (p<0.001).the mean and SD of pre-test VAS was 5.63±1.129 and post-test VAS was 3.13±1.224 with t- value of -13.577. There is a significant decrease in pain hence it's proven statistically significant (p<0.001).

➢ *Graph 1*



Graph 1 The mean difference of pre and post-test for dorsiflexion range of motion was measured there was a significant increase in DF ROM at the end of 4 weeks. Which is proven statistically significant. Whereas group 1 showed more significant than group 2.

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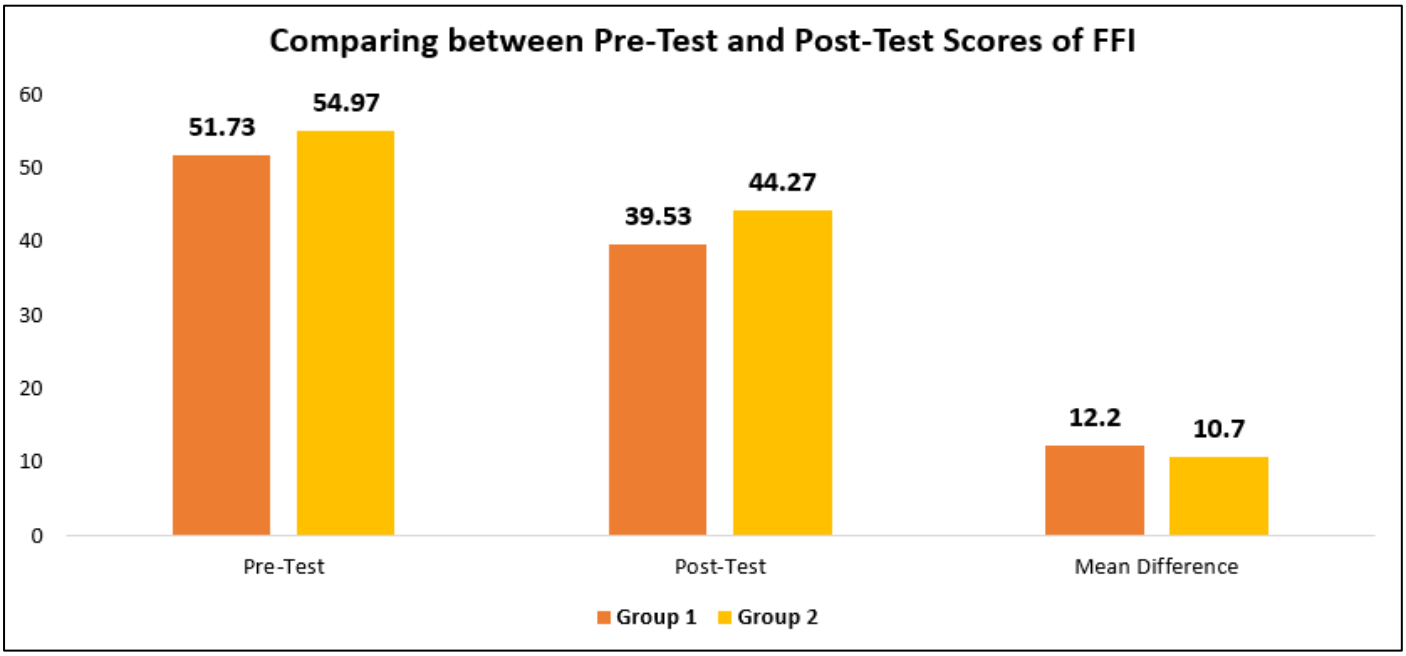
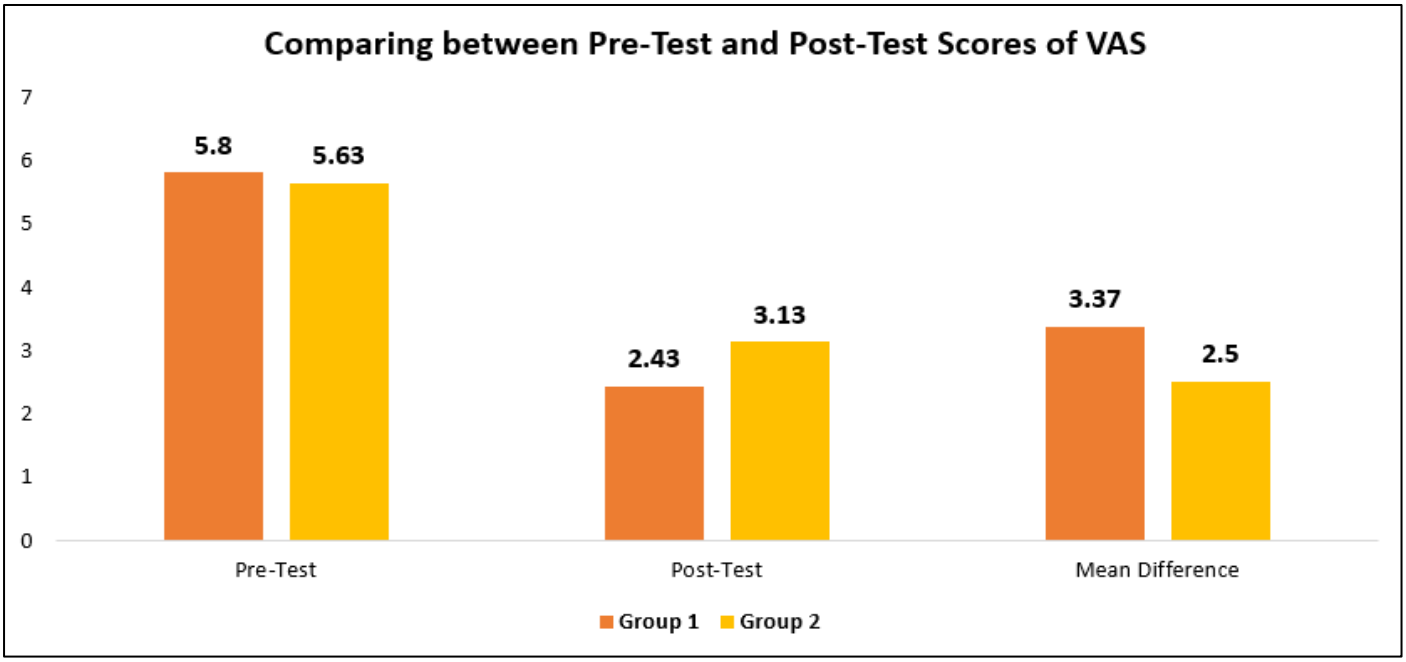
➢ *Graph 2*



Graph 2 The mean difference of pre and post-test for Foot Function Index was measured. There was a significant decrease in function disability. Whereas group 1 showed more significant in reduced functional disability than group 2 and is proven statistically significant ($p<0.001$).

➢ *Graph 3*



Graph 3 The mean difference of pre and post-test for VAS was measured and group 1 showed more significant in decreasing pain in post-test and is proven statistically significant.

V. DISCUSSION

This study aimed to compare the effectiveness of myofascial release versus foam roller in patients with plantar fasciitis. . Plantar fasciitis is defined as a localized inflammation and degeneration of the proximal plantar heel pain, also known as plantar fasciitis, is soreness or tenderness of the heel that is often restricted to the sole of the foot.[1] Plantar fasciitis is not the primary inflammatory process Rather, it is a degeneration of the plantar fascia caused by recurrent micro tears in the fascia that trigger an inflammatory response[2.] The individuals with plantar fasciitis were included in the study as per the inclusion criteria and the function and disability associated with plantar fasciitis was measured by Foot Function Index scale.

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It is considered that a variety of factors contribute to plantar fasciitis, with abnormal biomechanics and delayed healing being two possible causes. Studies also reported that poor biomechanics, like excessive pronation, have been linked with the major cause for plantar fasciitis[5]. Hence myofascial release and foam roller are the choice of intervention in my study because they addresses pain and improve range of motion of ankle joint.

As the range of ankle dorsiflexion decreases, the risk of plantar fasciitis increases. Plantar fasciitis is most prevalent in middle-aged and older adults. While the estimated lifetime incidence of the condition is 10%. A review of the literature shows that less than 5% of patients with known acute symptomatic plantar fasciitis eventually require surgery. Instead, these patients can be treated with a range of non-surgical modalities[9]. However, about 90% of patients with plantar fasciitis benefit from nonsurgical treatment [11].

Ul Abidin et al conducted a cross-sectional survey to find out the prevalence and associated risk factors for plantar fasciitis among security force personnel of Peshawar, Pakistan. It was shown that 13.2% of them reported having plantar fasciitis. They concluded that the prevalence of the illness was between the Age group 20 to 40, obesity, wearing tough shoes, field work, and standing for long periods of time (more than eight hours) were all found to be strongly associated with the condition[20]. And another study conducted by Aiman, U et.al proved that the 72% of Multan working women with plantar fasciitis report some amount of pain and difficulty. The pain increased as risk factors like prolonged standing, long workdays, unsuitable footwear, and poor posture become more prevalent.[21] hence these are the most common risk factors associated with plantar fasciitis. Thus it is highly recommended for the patients to participate in health education programs. Which should be held to protect individuals from plantar fasciitis, which is regarded as preventable condition.

L. Daniel Latt, et al has suggested in his study stating that the most common symptom associated with plantar fasciitis is plantar heel pain which is worst with first step in the morning or after periods of rest. Point soreness at the plantar fascia's origin on the calcaneus medial tubercle confirms the diagnosis.[22] Zenat khired et al through their study proved that the plantar fasciitis is a common, disabling condition that significantly lowers quality of life. It was also found to be more common in occupations requiring extended periods of standing or walking. Additional factors linked to plantar fasciitis included middle age, extended exercise, and tightness in the gastrocnemius muscle[23] thus screening for risk factors becomes an important factor for diagnosis of plantar fasciitis.

In order to restore adequate length, lessen discomfort, and improve function, myofascial release, or MFR, is a well-known manual therapy technique that manipulates the myofascial complex utilizing precisely guided low load, long duration mechanical stresses (Barnes, 1990). When used in conjunction with conventional therapy, MFR is reported to be helpful in providing rapid relief from pain and tissue discomfort.[15]

Yet another systemic review where 10 articles was reviewed from which 7 studies concluded that myofascial release technique was the most effective treatment in managing conditions like plantar fasciitis[16] yet another study conducted by J Stanek et al concluded that compressive myofascial release increases dorsiflexion ROM in a participants with restricted dorsiflexion. And he also suggested clinicians should consider incorporating compressive myofascial release technique into their therapy plan[25]. As stated by Hou et al. (2002) and McKenney et al. (2013), MFR practitioners claimed that the techniques were clinically effective in restoring physiologic systems that have been compromised by somatic dysfunctions and in providing immediate pain relief[15].

In a systemic review conducted by Tian-Tian Chang et al the foam roller was the popular device commonly used in sports and physical therapy in managing pain. The advantage of the foam roller was that it usually did not impair muscle strength, lessen muscle soreness, increase neuromuscular efficiency, and improve sprint performance and jump height. Their study also suggests that foam roller is an effective method for decreasing the stiffness of the gastrocnemius and increasing ankle dorsiflexion ROM[17].

Aishwarya R Ranbhor et al in their study using foam roller concluded that the effectiveness of foam roller was superior to stretching in terms of increase in pain pressure thresholds at gastrocnemius and soleus[26] however it was suggested to conduct comprehensive studies to understand the effects of stretching and foam rolling. whereas a similar study performed by YADAV, SUNNY et al correlated the Effect of Foam Rolling along with Self-stretching on decreasing Pain and improving Range of Motion in patients with Plantar Fasciitis found the effectiveness of foam rolling with self-stretching was superior to self-stretching in terms of increasing weight bearing lunge test using visual analogue scale and weight bearing lunge test as their outcome measure.[27]

Another study conducted by Hirose et al showed that Dorsiflexion ROM increased significantly by the foam roller intervention, however, muscle hardness and fascicle length did not change. It was suggested that foam roller protocol was found to be helpful in increasing ROM, and the author recommended that it can be used in clinical settings[28].

According to this systemic review conducted by AL Denton et al there was a modest support for using a foam roller or roller massager to increase range of motion. It was also suggested that in terms of frequency, duration, and outcome measures, future research should concentrate on prescribing SMFR in a more consistent manner[29].

Thus screening for dorsiflexion range of motion is essential for an effective rehabilitation program. The aim of this study was to determine the effectiveness of myofascial release technique versus foam roller for managing pain and

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improving dorsiflexion range of motion in patients with plantar fasciitis. For this study interventions, where the participants were randomly divided into two group, where group A was treated with myofascial release and group B with foam roller and both these groups received conventional therapy along with the intervention. Conventional therapy used in this current study for both the groups was stretching for 3 sets of 30 seconds hold for 3 repetitions along with strengthing of intrinsic foot muscles ultrasound therapy was given over the affected plantar surface of the foot with intensity 1.0W/cm^2 continuous mode and 3MH$_z$ depth for 7 minutes.

After the successful completion of the intervention at the end of 4th week the participants were evaluated. They were measured by the outcome measuring of FFI scale for Foot Function in terms of pain, disability and activity restriction, VAS scale for pain and Goniometer for assessing range of motion. Both group showed significant improvement in pain scores and range of motion, but group A was more significant compared to group B. In the present study, Myofascial release and the foam roller technique are beneficial for patients with plantar fasciitis, according to a statistical analysis of the pre and post treatment data. However, the myofascial release technique was more effective as it focused on improving ankle dorsiflexion range of motion, functional ability as measured by FFI, and pain reduction on VAS.

Foam roller was better in terms of patient self-learn technique and easy to follow and could be done while continuing day to day activity. And there was a minimal chances of error. While myofascial release a popular therapeutic approach used to alleviate muscle tension and improve flexibility by targeting the fascia, the connective tissue surrounding the muscle and also decrease muscle soreness and relieving joint stress and also increasing neuromuscular efficiency. MFR is a gentle and hands on method of soft tissue mobilization in order to release fascia restriction and restore its tissue, as developed by John Barnes. Therefore in the present study MFR was technically demanding, according to the participants education level, learning curve involved much higher than the use of foam roller.

VI. CONCLUSION

This study aimed to evaluate the combined effect of two different treatments, myofascial release and foam roller. And can conclude that both the interventions are equally effective and statistically significant, but myofascial release technique is more effective than foam roller technique in terms of decreasing pain and improving dorsiflexion range of motion.

VII. LIMITATIONS

The duration of the study was only 4 weeks with no long term follow up. The daily exercise level of those who took part was beyond our control. Increasing the degree of activity, starting new activities, or changing the time of day that the individuals engaged in activity could have had an impact on their sole temperature and stiffness throughout treatment. Other associated parameters like muscle strength and quality of life. Was not measured in this study and Age specific differences need to be considered.

REFERENCES

[1]. Landorf KB. Plantar heel pain and plantar fasciitis. BMJ clinical evidence. 2015;2015.

[2]. League AC. Current concepts review: plantar fasciitis. Foot & ankle international. 2008 Mar;29(3):358-66.

[3]. Kuhar S, Subhash K, Chitra J. Effectiveness of myofascial release in treatment of plantar fasciitis: A RCT. Indian J Physiother Occup Ther. 2007 Apr;1(3):3-9.

[4]. Bolgla LA, Malone TR. Plantar fasciitis and the windlass mechanism: a biomechanical link to clinical practice. Journal of athletic training. 2004 Jan;39(1):77.

[5]. Luffy L, Grosel J, Thomas R, So E. Plantar fasciitis: a review of treatments. JAAPA. 2018 Jan 1;31(1):20-4

[6]. Werner RA, Gell N, Hartigan A, Wiggerman N, Keyserling WM. Risk factors for plantar fasciitis among assembly plant workers. Pm&r. 2010 Feb 1;2(2):110-6.

[7]. Shetty R, Reilly I, Iyengar KP, Gallagher M, Botchu R. Survey of knowledge about anatomy and management of plantar fasciitis. Journal of the International Foot & Ankle Foundation. 2022 Oct 1;1(10).

[8]. Aradhya S, Tiwari V, Bakde AM, Dwidmuthe S, Roy M, MATH SA. Ultrasonographic Assessment of Indian Patients With Plantar Fasciitis and Its Clinical Correlation: A Prospective Observational Study. Cureus. 2023 Mar 4;15(3).

[9]. Joshvaghan HG, Omidi-Kashani F. Plantar Fasciitis Risk Factorsin Normal Population. Biosciences Biotechnology Research Asia. 2018 Jun 25;15(2):427-30.

[10]. Carlson RE, Fleming LL, Hutton WC. The biomechanical relationship between the tendoachilles, plantar fascia and metatarsophalangeal joint dorsiflexion angle. Foot & Ankle International. 2000 Jan;21(1):18-25.

[11]. Neufeld SK, Cerrato R. Plantar fasciitis: evaluation and treatment. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2008 Jun 1;16(6):338-46.

[12]. Kadlag SB. *A Study to Evaluate the Effectiveness of Myofascial Release (MFR) & Iontophoresis in Treatment of Plantar Fasciitis* (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India))

[13]. Hemlata NK, Praveen S, Kumar S, Badoni N. Comparison of The Effectiveness of Myofacial Release Technique and Stretching Exercise on Plantar Fascitis. Physiotherapy and Occupational Therapy. 2019 Apr;12(2).

[14]. ` Lipa LY, Kalita A, Dutta A. A Comparative Study To Find Out The Effectiveness Of Myofascial Release Technique Along With Stretching Versus Myofascial Release Technique In Patients With Plantar

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14849340

Fasciitis.(2022). Int. J. Life Sci. Pharma Res.;12(1):L183-193.
[15]. Ajimsha MS, Al-Mudahka NR, Al-Madzhar JA. Effectiveness of myofascial release: systematic review of randomized controlled trials. Journal of bodywork and movement therapies. 2015 Jan 1;19(1):102-12.
[16]. Tandel HI, Shukla YU. Effect of Myofascial Release Technique in Plantar Fasciitis on Pain and Function-An Evidence Based Study. International Journal of Science and Healthcare Research. 2021 Apr;6(2):332-7.
[17]. Chang TT, Li Z, Zhu YC, Wang XQ, Zhang ZJ. Effects of self-myofascial release using a foam roller on the stiffness of the gastrocnemius-achilles tendon complex and ankle dorsiflexion range of motion. Frontiers in Physiology. 2021 Sep 17;12:718827.
[18]. Stovern O, Henning C, Porcari JP, Doberstein S, Emineth K, Arney BE, Foster C. The effect of training with a foam roller on ankle and knee range of motion, hamstring flexibility, agility, and vertical jump height. Int J Res Ex Phys. 2019;15(1):39-49.
[19]. Couture G, Karlik D, Glass SC, Hatzel BM. The effect of foam rolling duration on hamstring range of motion. The open orthopaedics journal. 2015;9:450.
[20]. Abidin SZ, Haneef K, Malik NR, Mashal M, Zeb A, Rahman MU. Prevelance and associated risk factors for plantar fasciitis among security forces personnel in peshawar. Annals of Allied Health Sciences. 2019 Dec 31;5(2):20-3.
[21]. Aiman U, Malik L, Zahoor A. PAIN AND DIFFICULTY LEVEL IN WORKING FEMALES HAVING PLANTAR FASCIITIS OF MULTAN CITY: Pain & Difficulty in Working females with Plantar Fasciitis. Pakistan BioMedical Journal. 2022 Aug 31:46-50
[22]. Latt LD, Jaffe DE, Tang Y, Taljanovic MS. Evaluation and treatment of chronic plantar fasciitis. Foot & ankle orthopaedics. 2020 Feb 5;5(1):2473011419896763.
[23]. Khired Z, Najmi MH, Akkur AA, Mashhour MA, Bakri KA. The Prevalence and Risk Factors of Plantar Fasciitis Amongst the Population of Jazan. Cureus. 2022 Sep 21;14(9):e29434. doi: 10.7759/cureus.29434. PMID: 36312600; PMCID: PMC9595252.
[24]. Sarkar B, Mangalam AK, Sahay P. Efficacy of muscle energy technique as compared to myofascial trigger point release in chronic plantar fasciitis: a double blind randomized clinical trial. Int J Health Sci Res. 2018;8(6):128-36.
[25]. Stanek J, Sullivan T, Davis S. Comparison of compressive myofascial release and the graston technique for improving ankle-dorsiflexion range of motion. Journal of athletic training. 2018 Feb 1;53(2):160-7.
[26]. Ranbhor AR, Prabhakar AJ, Eapen C. Immediate effect of foam roller on pain and ankle range of motion in patients with plantar fasciitis: A randomized controlled trial. Hong Kong Physiotherapy Journal. 2021 Jun 8;41(01):25-33.
[27]. YADAV S, MALIK S, BANSAL S. Effect of Foam Rolling along with Self-stretching on Pain and Range of Motion in Plantar Fasciitis Patient-A Quasi-experimental Study. Journal of Clinical & Diagnostic Research. 2022 May 1;16(5).
[28]. Yoshimura A, Schleip R, Hirose N. Effects of self-massage using a foam roller on ankle range of motion and gastrocnemius fascicle length and muscle hardness: A pilot study. Journal of sport rehabilitation. 2020 Feb 11;29(8):1171-8.
[29]. Denton AL. *The effectiveness of self-myofascial release with foam rollers or roller massagers on range of motion: a systematic review* (Master's thesis).