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Effectiveness Of Self-Myofascial Release And Stretching Exercise Along With Ultrasound Therapy Among Patients With Plantar Fascitis - A Randomized Controlled Trial (Rct)

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Abstract: **Background**: Prolonged standing, over pronation, High-Arched Feet, Leg-length discrepancy, improper footwear and increased BMI may contribute to plantar fascitis. Myofascial release applies pressure to change the fiber length. Increased tissue elasticity allows more movement with fascia tissue and prevents restrictions and adhesions from occurring. Stretching focused on gastrocnemius and soleus muscles is effective because it increases Achilles' tendon flexibility which in turn reduces the tensile forces applied to the plantar aponeurosis. Ultrasound therapy helps to relieve pain by increased local metabolism, circulation and extensibility of connective tissue and tissue regeneration. Hence the purpose of the study is to compare effectiveness of Self Myofascial release and stretching with both in the combination of ultrasound therapy in reducing the pain and improving the range of motion and functional ability in patients with plantar fascitis.

Methods: A total of 50 samples were taken from outpatient physiotherapy department, AVMC&H, and Puducherry. They were divided into 2 groups - Group A and Group - B (25 subjects in each group). Group A received Self Myofascial release with ultrasound therapy and Group B received stretching exercise with ultrasound therapy for a period of 4 days a week for 2 weeks. Prior to the study, the objectives and guidelines were explained to all the participants and written informed consent form and information form were signed by the participants. The pretests and posttests Foot Function Index scale and ankle range of motion using Universal Goniometer were recorded before and after the intervention of 2 weeks.

Results: The results of the study were significant improvement in Self Myofascial release with ultrasound therapy was much better than stretching exercise with ultrasound therapy.

Conclusion: The study concluded that the self-Myofascial release with ultrasound therapy were effective in reducing the pain and improving range of motion and foot function in patients with plantar fascitis.

Keywords **-** Plantar fascitis, Myofascial release, stretching, lacrosse ball, ultrasound therapy.

I. INTRODUCTION

Plantar fascitis (PF) is a degenerative syndrome of the plantar fascia resulting from repeated trauma at its origin on the calcaneus.[1] The plantar fascia is a thickened fibrous sheet of connective tissue that originates from the medial tubercle on the undersurface of the calcaneus and fans out, attaching to the plantar plates of the metatarsophalangeal joints to form the medial longitudinal arch of the foot. In general, the purpose of the plantar fascia is twofold – to provide support of the longitudinal arch and to serve as a dynamic shock absorber for the foot and entire leg. [2]

The origin is hypothesized to be the site of pain in plantar fascia due to biomechanical overuse from prolonged standing or jogging. [3] The occurrence of plantar fascitis is usually associated with prolonged weight-bearing works such as waiters, maids, kitchen workers, athletics, teachers and military personnel, are at a higher risk of developing plantar fascitis. [4,5] The prevalence of plantar fasciitis was lowest in those aged 18-44 and highest in those aged 45-64. Females were 2.5 times more like to report plantar fasciitis than males. According to the symptoms, plantar fascitis varies as acute stage, less than 2 weeks, sub-acute stage, 2-6 weeks and chronic stage, more than 6 weeks. [6] Other names for plantar fascitis include painful heel syndrome, heel spur syndrome, runner's heel, sub calcaneal pain, calcaneodynia, and calcaneal periostitis. [7,8] Physical examination presents with localized tenderness at the antero-medial aspect of the calcaneus. Pain may be exacerbated by passive dorsiflexion of the toes or having the patient stand on the tips of the toes. [9] Patient reports of pain to be particularly bad with the first steps taken in the morning and the pain will subside slowly during the next 30-45 minutes. [10,11]

Physiotherapy interventions for plantar fascitis are strengthening exercises, night splints, orthoses, taping, dry needling, extracorporeal shockwave therapy and manual techniques like joint mobilization, massage and Myofascial trigger point release. SMFR is a technique used to treat Myofascial restrictions and restore the normal soft – tissue extensibility, to increase Myofascial mobility, foam roll and roller massager are commonly used tools. The clients use their body weight to apply pressure to the soft- tissues during the rolling motion with foam roller or roller massager. [12] Stretching is a general term used to describe any therapeutic manoeuvre designed to increases the extensibility of soft tissues, thereby improving flexibility by elongation of the shortened structures.

Ultrasound therapy is a method of applying deep heat to connective tissue which plays an important role in relieving plantar heel pain by both thermal and mechanical effect on target tissue resulting in increased local metabolism, circulation and extensibility of connective tissue and tissue regeneration. [13] So this study is to find compare the effectiveness of self-myofascial release and stretching technique with both in the combination of ultrasound therapy in reducing pain and improve the range of motion and functional ability of the patients with plantar fascitis.

II. SUBJECTS AND METHODS

A total of 50 samples were taken from outpatient physiotherapy department, Aarupadai Veedu Medical College & Hospital, and Puducherry. They were divided into 2 groups - Group A and Group - B (25 subjects in each group). Group A received Self myofascial release with ultrasound therapy and Group B received stretching exercise with ultrasound therapy for a period of 4 days a week for 2 weeks. Prior to the study, the objectives and guidelines were explained to all the participants and written informed consent form and information form were signed by the participants. The pre-tests and post-tests –Foot Function Index scale and ankle range of motion by using Universal Goniometer were recorded before and after the intervention of 2 weeks. The exercises were taught and demonstrated by the researcher and then the subjects were made to do.

TREATMENT TECHNIQUE

- **GROUP A: SELF - MYOFASCIAL RELEASE (SMFR)**

Plantar Fascia – The patient was instructed to be in sitting position and place a lacrosse ball underneath the arch of your foot. Slowly roll the ball front and back, perform for 20-30 seconds and repeat 2-3 times. 1 session per day for 4 days per week for 2 weeks.

- **GROUP B: STRETCHING EXERCISES**

Active Plantar Fascia Stretching - Patient in Stand with foot directly in front of a wall. Make sure your shoe is off. Slowly position your foot so that your big toe is resting on the wall and the ball of your foot is a few centimetres from the floor. Your big toe should be bending gently backward. A gentle stretch should be felt on the bottom of your foot. Hold this position for 15 seconds and then take your foot away from the wall. Repeat the stretch 5 times. 1 session per day for 4 days per week for 2 weeks.

Calf Stretch - Standing up with knee extended, place the foot over a step or stair, supporting only the front half of the foot. Let the body fall gently notice the tension in the gastrocnemius and soleus. Hold this stretch for 10 -15 seconds, Repeat the stretch 5 times. 1 session per day for 4 days per week for 2 weeks.

- **BOTH GROUP A & B: ULTRASOUND THERAPY**

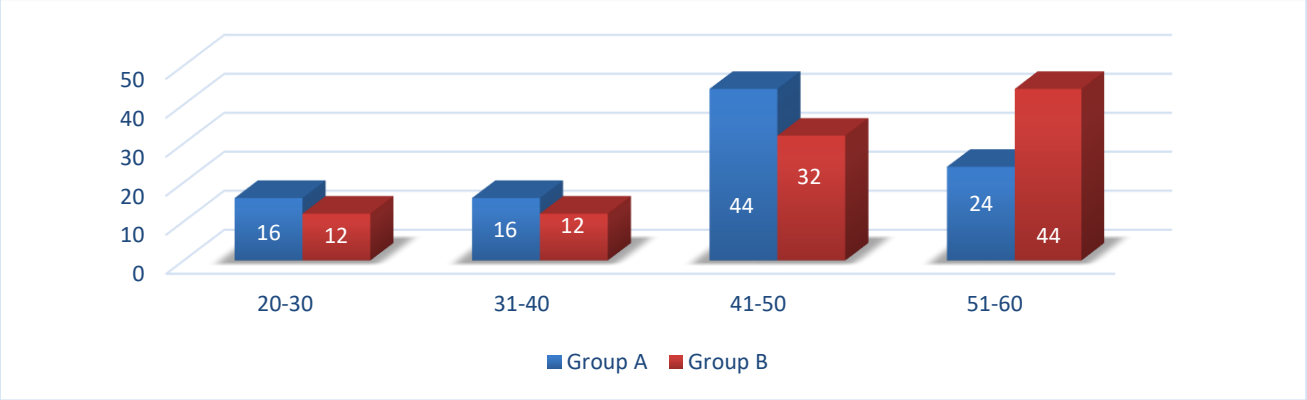
Patient in positioned with prone lying knee are slightly flexed and pillow is kept under the lower leg to be treated. Ultrasound therapy is given with continuous mode in concentric circles method using 1MHZ frequency and 1.5W/ cm2, 10 minutes one session per day for 4 days per week for 2 weeks.

III. DATA ANALYSIS

Table 4.1: Age Distribution

Age	Group A		Group B	
	Numbers	Percentage	Number	Percentage
20-30	4	16	3	12
31-40	4	16	3	12
41-50	11	44	8	32
51-60	6	24	11	44
TOTAL	25	100	25	100

Between 20-30 years Group A consist of 16% of peoples and Group B consist of 12%, in 31 – 40 years Group A consist of 16% and Group B consist of 12%, in 41- 50 years Group A consist of 44% and Group B consist of 32%of peoples and in 51-60 years Group A consist of 24%and Group B consist of 44%of peoples.

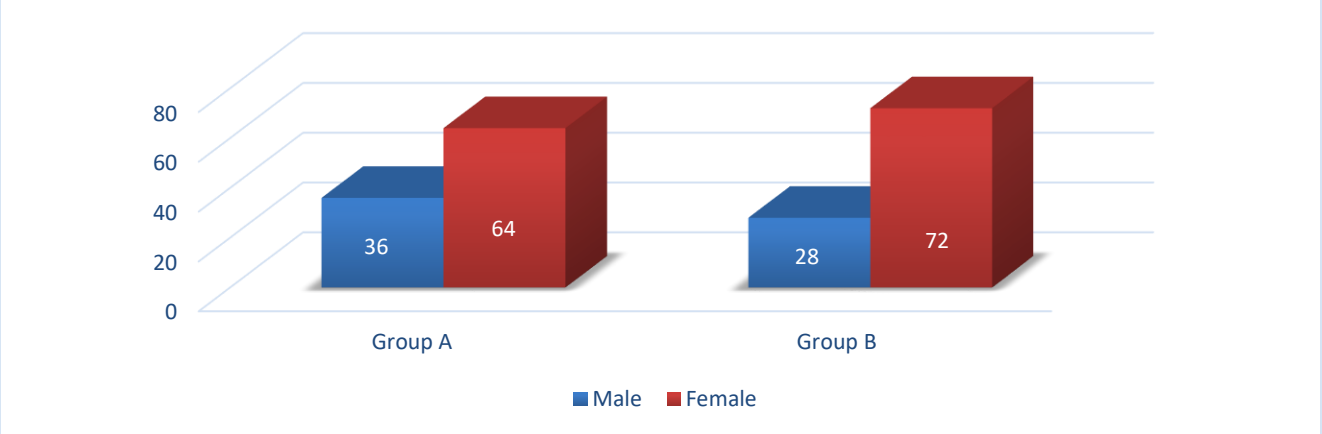


Graph 4.1: Representation Of Age Distribution Between Groups

Table 4.2: Gender Distribution

Gender	Group A		Group B	
	Numbers	Percentage	Number	Percentage
Male	9	36	7	28
Female	16	64	18	72
Total	25	100	25	100

In Group A 36% male and 64% were female whereas in Group B 28% were male and 72% were female

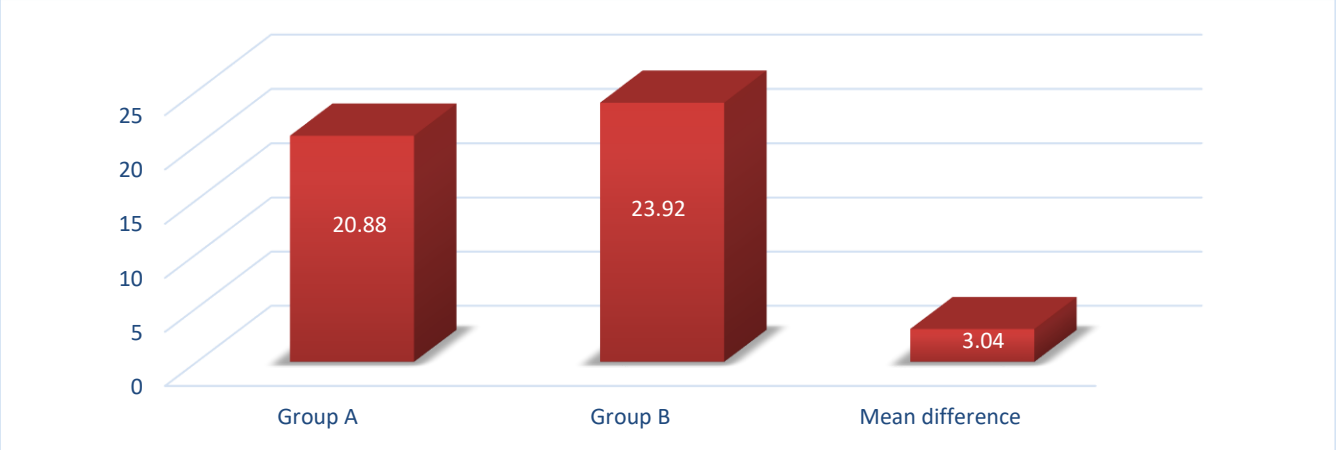


Graph 4.2: Representation Of Gender Distribution Between Groups.

Table 4.3: The Table Shows Post-Test Mean Value, Mean Difference, Standard Deviation And Unpaired 't' Value Of FFI Between Group A and Group B

SI.NO	Groups	Improvement		Standard deviation	Unpaired t test
		Mean	Mean difference		
1.	A	20.88	3.04	4.74	2.2696
2.	B	23.92		4.73	

In Group A and B for FFI calculated unpaired 't' value is 2.2696, the above value shows that there is significant difference between self-myofascial release with ultrasound therapy and stretching exercise with ultrasound therapy in the management of foot function among plantar fascitis patients.

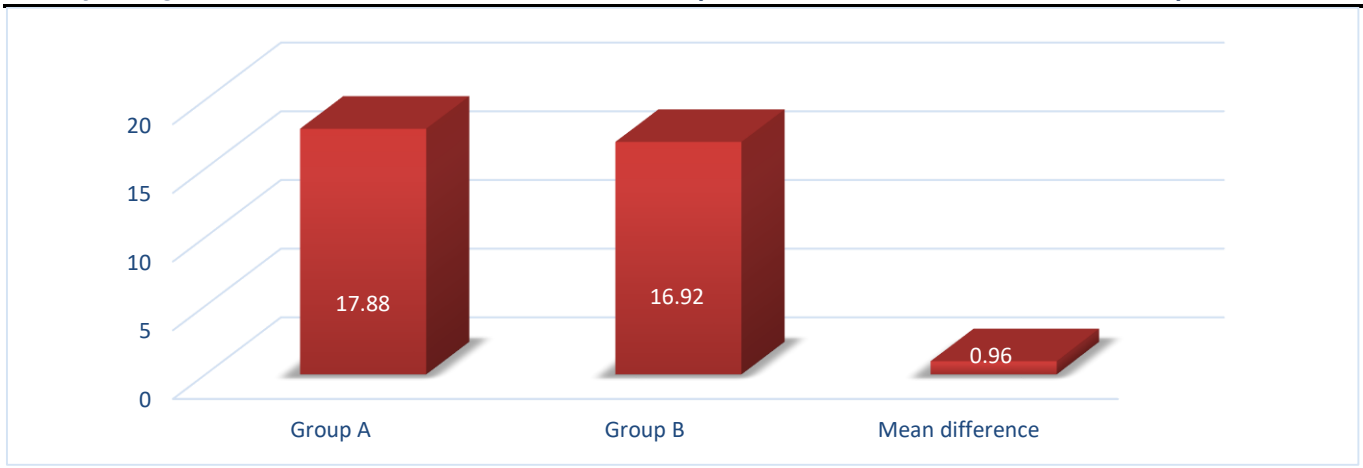


Graph 4.3: Shows The Graphical Representation Of Post-Test Mean Values Of FFI For Group A and B

Table 4.4: The Table Shows Post-Test Mean Value, Mean Difference, Standard Deviation And Unpaired 't' Value Of Ankle Dorsiflexion Between Group A and Group B

SI.NO	Groups	Improvement		Standard deviation	Unpaired t test
		Mean	Mean difference		
1.	A	17.88	0.96	1.20	2.6544
2.	B	16.92		1.35	

In Group A and B calculated unpaired 't' value is 2.6544, the above value shows that there is significant difference between self-Myofascial release with ultrasound therapy and stretching exercise with ultrasound therapy in ankle dorsiflexion among plantar fascitis patients.

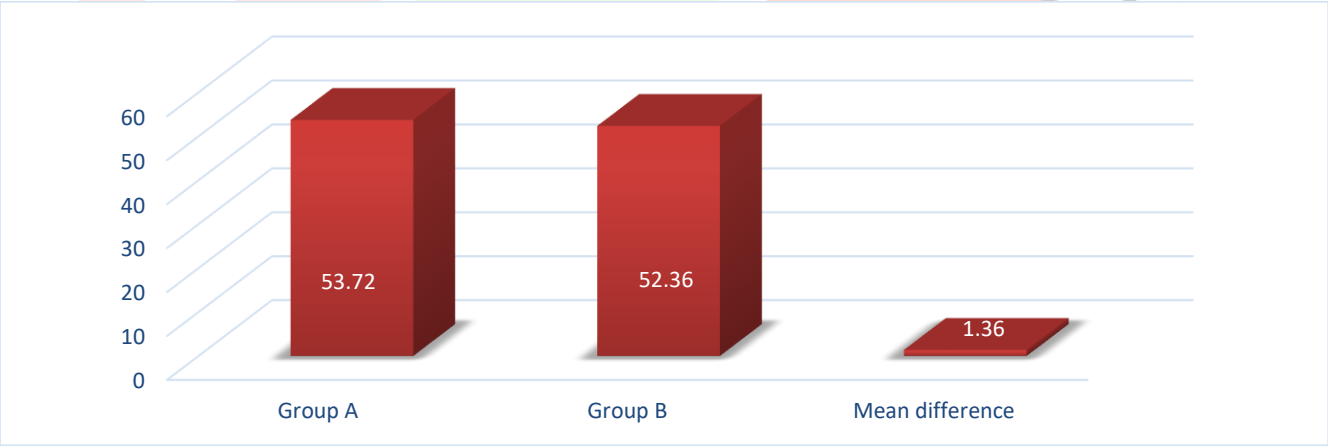


Graph 4.4: Shows The Graphical Representation Of Ankle Dorsiflexion For Group A And Group B.

Table 4.5: The Table Shows Post-Test Mean Value, Mean Difference, Standard Deviation And Unpaired 't' Value Of Ankle Plantarflexion Between Group A and Group B

SI.NO	Groups	Improvement		Standard deviation	Unpaired t test
		Mean	Mean difference		
1.	A	53.72	1.36	2.28	2.4775
2.	B	52.36		1.52	

In Group A and B calculated unpaired 't' value is 2.4775, the above value shows that there is significant difference between self-myofascial release with ultrasound therapy and stretching exercise with ultrasound therapy in ankle plantar flexion among plantar fascitis patients.



Graph 4.5: Shows The Graphical Representation Of Ankle Plantarflexion For Group A And Group B.

IV. RESULT

The results of this study were significant improvement in self-myofascial release with ultrasound therapy was much better than stretching exercise with ultrasound therapy. The statistical interpretation of mean and standard deviation shows the improvement in self-myofascial release with ultrasound in patients with plantar fascitis.

V. DISCUSSION

Plantar fascitis is one of the conditions, which can be treated by a wide variety of physiotherapy methods. It is still difficult to formulate all proof guidelines for the management of plantar fasciitis. Various methods of treatment exist with own claims of success without any attempts of comparing the maximal methods. This present study examined the efficacy of self-myofascial release and stretching exercise along with ultrasound therapy on range of motion and functional disability among patients with plantar fasciitis. A totally 50 patients with plantar fasciitis patients were included in this study, they divided into 2 groups - group A & B. Group A received self-myofascial release with ultrasound therapy and group B received stretching exercise with ultrasound therapy for a period of 4 days a week for 2 weeks. The aim of the study was to evaluate the effectiveness of self-myofascial release with ultrasound therapy and stretching exercise with ultrasound therapy on reduction of pain and improving range of motion and foot function among patients with plantar fasciitis.

In age distribution, Group A (n=25) and Group B (n=25) and in gender distribution In Group A 36% male and 64 % were female whereas in Group B 28 % were male and 27 % were female

The present study result shows that in group wise analyze, the ankle range of motion were higher in Group A than Group B but it is statistically significant ('p' = 0.001). The present study reveals that, myofascial release with Ultrasound therapy showed statistically significant reduction in functional disability stretching exercise ('p'= 0.001). The exact mechanism behind the role of SMFR in improving plantar fasciitis is still not clear. Meltzer et al demonstrated that MFR causes apoptotic rate normalization, changes in cell morphology and reorientation of fibroblasts. This facilitates the healing processes by halting degeneration of plantar fascia which may possibly decrease the pain. Also, a study suggests that MFR helps to return the shortened fascial tissues to its normal length by collagen reorganization. MFR stimulates the afferent A delta fibers which causes segmental pain modulation, supporting the analgesic effect of MFR. Satish C. Pant et al., showed that myofascial release is better than stretching, Another study was done by P Sivasankar to find out effect of ultrasound therapy and Myofascial Release on pain and function in patients with plantar fasciitis and concluded that both ultrasound therapy and myofascial release is effective on pain and function in patients with plantar fasciitis. These two study strongly supports my present study that myofascial release was used to reduce functional disability. Therefore, current study shows that statically significant in improvement in both the groups and myofascial release with Ultrasound therapy shows greater improvement in reduction of pain and functional disability. Therefore, current study shows that statically significant in improvement in both the groups and self-myofascial release with ultrasound therapy shows greater improvement in reduction of pain and improves range of motion and functional ability.

VI. CONCLUSION

The study concluded that the self-myofascial release with ultrasound therapy were effective in reducing the pain and improving range of motion and functional ability in patients with plantar fascitis. While comparing group A and group B, there was statistical reduction in pain and improvement in range of motion and functional ability was effective in group A than group B

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