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To find out the effects of myofascial release in the management of Plantar Fasciitis

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ABSTRACT

Background: Plantar fasciitis is regarded as the supreme reason of inferior heel pain. The pain and discomfort that comes with this condition have an intense impact on physical mobility and function. This study was conducted to evaluate the effectiveness of Myofascial release with conventional physical therapy in patients with chronic plantar fasciitis. **Methods:** Subjects were clinically diagnosed with chronic plantar fasciitis and then screened after assessing their suitability according to the inclusion and exclusion criteria. Subjects participating in the study were instructed about the nature of the study and the interventions and an informed written consent was taken. Data was collected from the patients visiting the outpatient department of Pakistan Institute of Medical Sciences (PIMS) Islamabad and Mega Medical Complex Hospital Rawalpindi. n=30 patients were divided into two groups using random allocation with n= 15 in each group, Group 1 received MFR with conventional physical therapy (ultrasound and exercise therapy) whereas Group 2 received conventional physical therapy alone. The treatment was given on alternative days for 2 weeks. **Results:** Within group analysis was done with repetitive measure ANOVA, mean percentage of visual analog scale for both groups were same at the baseline but for experimental group significantly decrease from baseline (8.00) to midline (4.73) and at the end of session (1.40). While, mean percentage of FFI in experimental group significantly decreased from baseline to midline and till the end of the sessions. Between the group analysis was performed with independent t-test and results of VAS and FFI were statistically significant in both groups (p<0.01) but mean values showed that experimental group showed more reduction in pain and improved functional level as compared to control group. **Conclusion:** Myofascial release technique with conventional physical therapy showed efficacy in reducing the pain intensity and increasing the foot function in chronic plantar fasciitis patients. This study will benefit the patients of plantar fasciitis for better management of their condition and thus overall quality of life of such patients will improve in future.

Keywords: Plantar fasciitis, Myofascial release, stretching technique, ultrasound, visual analogue scale, foot functional index

INTRODUCTION

Plantar fasciitis is defined as inflammation of the Plantar fascia which is described by localized pain at the calcaneal region of the plantar fascia[1]. It accounts for one of the most common cause of pain in the foot and heel region. This painful condition is initiated by weight bearing after prolonged period of rest. Micro tears can result due to repeated injuries or stress loading over the plantar surface which would ultimately lead to inflammatory and degenerative changes of the connective tissues in the fascia[2]. Females are most commonly affected by the plantar fasciitis as compared to males[3].

Increasing age and Body Mass Index(BMI) is also associated with the decrease in elasticity of the fascia which furthers causes reduction in the shock absorbing capabilities of the degenerative fascia that leads towards the inability to resist normal tensile loads[4]. In the functioning of plantar fascia, posterior calf musculature plays an essential role. Either tightness or weakness results in disruption of the posterior calf musculature that would ultimately leads to altered biomechanics of the foot[5].

Estimated prevalence of plantar fasciitis is about 10% among the general population. Most frequently patients are presented with unilateral symptoms while about 30% of the cases involvement is bilateral in nature[6, 7]. The diagnosis of plantar fasciitis is made on the basis of evocation of pain in the heel particularly while taking first few steps after waking up from the bed usually in morning or after a period of rest which is highly suggestive of plantar fasciitis[8].

There are different treatment strategies for plantar fasciitis which includes rest, ice, stretching, NSAIDS, Corticosteroids injections, extracorporeal shock wave therapy, iontophoresis of dexamethasone, various orthotics including night splints, low profile plastic heel cups, electrotherapeutic modalities, Kinesiotaping and manual therapy (soft tissue mobilization & joint mobilizations)[9, 10]. Myofascial release (MFR) technique applies stretch of a long duration with low load to the Myofascial complex of the body. The purpose is to regain the ideal length, reduction in pain and improvement in function. It has been postulated that restriction of fascia in one region of the body can result in excessive tension in another region of the body due to the continuity of the fascia. This will lead to excessive pressure on other structures that a fascia divides or supports. The excessive pressure on pain sensitive structures such as nerve and blood vessel can be relieved by regaining the length and strength of restricted connective tissue; MFR commonly involves application of persistent and slow pressure (120 – 300 seconds) to restricted fascial layers either through direct technique MFR or indirect technique MFR[11]. Recently myofascial trigger point release has been advocated for treatment of this condition, while very few researches had been conducted to support the effectiveness of myofascial release in management of plantar fasciitis[12, 13]. Ultrasonic waves are sound waves with high frequency having strong affinity for ligaments and tendons. Ultrasound provides heating effect to the tissues and tissue absorb the energy, that in turn results in softening and increase in circulation and also increased temperature and metabolism in localized tissue [13, 14]. Ultrasound has also been professed to increase chemical activity in tissue, membrane permeability, distort molecular structures and altered diffusion and protein synthesis rates, all causing rapid tissue repair [15, 16]. Robertson and Baker did a systemic review on the effectiveness of ultrasound for treating patients of musculoskeletal injuries and for enhancing soft tissue healing (17). Davis et al. concluded that the conservative management regarding heel pain is effective in 89% of patients[15, 16].

Current study's objective is to assess the effectiveness of Myofascial release technique (MFR) as a mode of treatment and to find out more & better treatment option in chronic plantar fasciitis. The findings of this research will assist in establishing the effectiveness of myofascial release technique, thus aims to be proven beneficial in patients suffering from plantar fasciitis.

MATERIALS AND METHODS

This randomized control trial was completed over a time period of 04 months from April 2019 to July 2019 at OPD of Pakistan Institute of Medical Sciences (PIMS) Islamabad and Mega Medical Complex Hospital Rawalpindi. Sample size was 30. Data of total 11 males and 19 females were selected through non-probability purposive sampling technique and allocated randomly into experimental(n=15) and control groups(n=15) Patients with ages between 25-40 years, having pain from at least last 06 weeks with unilateral & bilateral involvement and had confirmed diagnosis of PF with no associated co-morbidities were recruited in the study. Patients with any prior surgery to distal tibia, fibula, ankle joint or rear foot region in last 06 months, presence of any

red flags i.e., tumor, fracture, and heterotrophic ossification and had acute inflammatory condition at ankle-foot region were excluded from the study. Data was collected through self-structured questionnaire contained Visual analogue scale and Functional foot index measured the level of pain, severity and functional disability associated with plantar fascia pathology. Ethical approval was taken from the ethical review committee of Bashir Institute of Health sciences, Islamabad, Pakistan. Consent was taken from all the patients included in the study and then interventions were applied. Experimental Group received Myofascial release with conventional physiotherapy (Ultrasound+ stretching exercises) and control group received conventional physiotherapy alone.

Statistical analysis

For within the group analysis, statistical test of Repeated measure ANOVA was used and for between the group results, Independent t-test was used. The data was analyzed through SPSS version 21.

RESULTS

In the current study, In experimental group there were 5(33.3%) males and 10(66.7%) females, while in control group there were 6(40%) males and 9(60%) females.

Cross tabulation has been done between age and gender of the whole sample size. (Figure:1) X-axis shows gender distribution while Y-axis shows number of patients in sample size with respect to specific age.

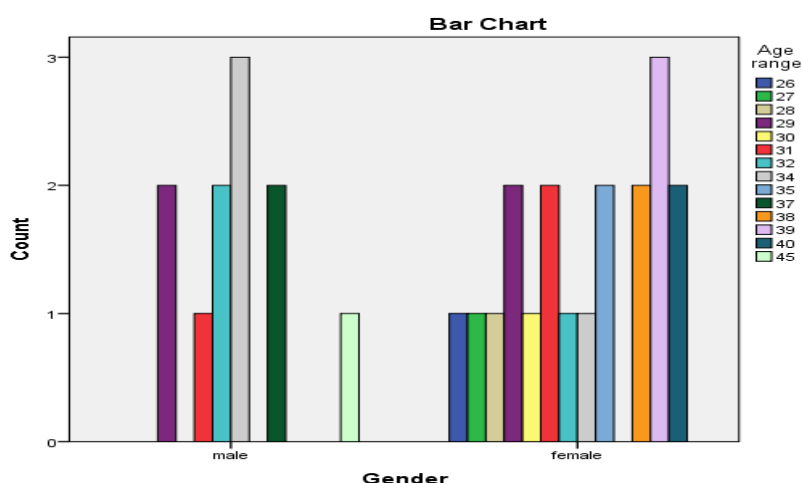


Figure 1: Bar chart showing cross tabulation between age and gender of participant's

RESULTS OF BETWEEN GROUPS COMPARISON

Independent T-test was applied between group analysis. At the baseline of treatment mean percentage and standard deviation (SD) of functional foot index (FFI) in experimental and control group was (M+S.D 71.33+9.485 and 68.79 +15.762) respectively with P value (0.596). The value of visual analogue scale (VAS) in experimental and control group was (M+S.D 8.00+1.309 and 8.00+1.00) respectively with p value (1.00) (Table: 1).

Table 1: Independent t-test at Baseline treatment session. (SD=*Standard deviation)

Item	Group A (Experimental)		Group B (Control)		p-value
	Mean	SD	Mean	SD*	
Functional foot index	71.33	9.485	68.79	15.762	0.596
Visual analog scale	8.00	1.309	8.00	1.00	1.00

At the midline of treatment mean percentage and standard deviation of FFI in experimental and control group was (M+S.D 41.96+12.120 and 58.60 +15.224) respectively with P value (0.03). The values of VAS in experimental and control group were (M+S.D 4.73+1.624 and 6.53+0.834) respectively with p value (0.01). (Table: 2)

Table 2: Independent t-test at midline treatment session

Item	Group A (Experimental)		Group B (Control)		p-value
	Mean	SD	Mean	SD*	
Functional foot index	41.96	12.12	58.60	15.24	0.003
Visual analog scale	4.73	1.62	6.53	0.834	0.001

*SD=Standard deviation

At the final treatment session mean percentage and standard deviation of FFI in experimental and control group was (M+S.D 15.25+8.024 and 49.40+13.830) respectively with P value (0.00). The value of VAS in experimental and control group was (M+S.D 1.40+1.121 and 5.20+1.082) respectively with P value (0.00) (Table: 3)

Table 3: Independent t-test at final treatment session

Item	Group A (Experimental)		Group B (Control)		p-value
	Mean	SD	Mean	SD*	
Functional foot index	15.25	5.024	49.40	13.830	0.000
Visual analog scale	1.40	1.121	5.20	1.082	0.000

*SD = Standard deviation

RESULTS OF COMPARISON WITHIN GROUPS:

Within group analysis was done with repetitive measure ANOVA, values are given in tables 4-6. Variables showed significant improvement in both groups as the value of Wilks' Lambda is < 0.05.

(Table: 4) Baseline treatment vs. midline treatment values within group. (*S.D= Standard deviation p = p value)

Item	Group A (Experimental)				p-value	Group B (Control)				p-value
	0 session		3 session			0 session		3 session		
	Mean	S.D*	Mean	S.D*		Mean	S.D*	Mean	S.D*	
Functional foot index	71.33	1.48	1.96	2.12	0.02	68.79	5.76	58.60	5.22	0.03
Visual Analog scale	8.00	1.30	1.73	1.62	0.003	8.00	1.05	6.53	0.83	0.04

(Table: 5) Midline vs. final treatment values within group

Item	Group A (Experimental)				p-value	Group B (Control)				p-value
	3 session		6 session			3 session		6 session		
	Mean	S.D*	Mean	S.D*		Mean	S.D*	Mean	S.D*	
Functional foot index	41.96	12.12	15.25	8.024	0.01	58.60	15.22	49.40	13.83	0.02
Visual analog scale	4.73	1.62	1.40	1.121	0.01	6.53	0.83	5.20	1.08	0.03

* S.D= Standard deviation p= p value

(Table: 6) Final treatment vs. Base line treatment values within group

Item	Group A (Experimental)				p-value	Group B (Control)				p-value
	6 session		0 session			6 session		0 session		
	Mean	S.D*	Mean	S.D*		Mean	S.D*	Mean	S.D*	
Functional foot index	15.25	8.02	71.33	9.48	0.00	49.40	13.83	68.79	15.76	0.00
Visual analog scale	1.40	1.12	8.00	1.309	0.00	5.20	1.082	8.00	1.00	0.01

*S.D Standard deviation p= p value

Mean percentages of functional foot index and visual analogue scale at the baseline, midline and end of the sessions are given in Figure 2 & 3.

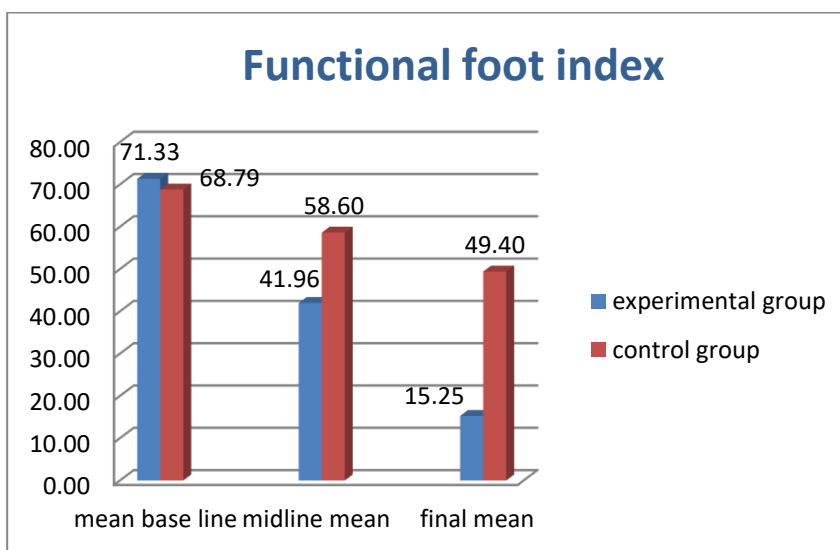


Figure 2: Bar chart showing Mean values of FFI at different intervals of treatment.

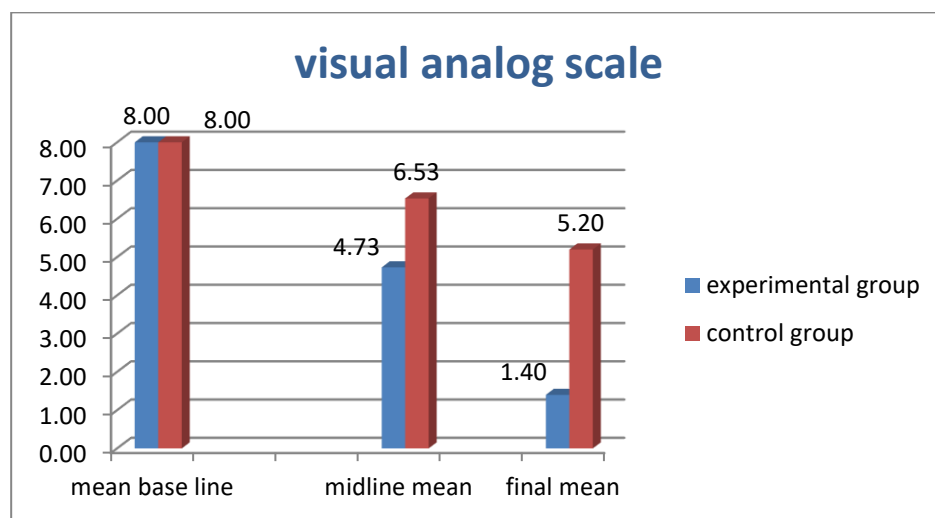


Figure 3: Bar chart showing Mean values of VAS at different intervals of treatment.

DISCUSSION

Results from this study showed that Myofascial release along with ultrasound and stretching exercises provide a greater immediate decrease in pain and percentage of FFI than only conventional physical therapy in plantar fasciitis. Experimental group showed statistically significant results with P value = 0.00 for both VAS and FFI. The results rejected our null hypothesis so we accepted experimental hypothesis.

One of the studies conducted in 2007 by Suman Kuhar et.al. to find out the effectiveness of Myofascial release in treatment of plantar fasciitis was very much similar to current study in sample size, type of study, allocation of groups, outcome variables and in results but differ in interventions given to both groups. In this past study, Group A (control) received therapeutic ultrasound (1 MHz, 1 Watt/cm², pulsed mode 1:4,5 minutes), contrast bath for 20 minutes, foot intrinsic muscles strengthening exercises, plantar fascia stretching exercises and group B (experimental) received conventional treatment as group A added with Myofascial release for 15 minutes for 10 consecutive days. The result of their study was Myofascial release is an effective therapeutic option in the treatment of plantar fasciitis. While in our study, the interventions of Experimental group include Myofascial release, ultrasound and stretching exercises and control group received ultrasound and stretching exercises alone [17].

One of the studies conducted by M.S. Ajimshaa (2014) and colleagues was very much similar with current study on the basis of measuring tools (FFI and VAS scale) and treatment technique. Their study was done to investigate the effect of Myofascial release technique on patients with plantar fasciitis. In this RCT, both groups received 12 sessions of treatment over 4 weeks where the experimental group received Myofascial release technique and the control group received ultrasound therapy. In all measured variables of this study, experimental group showed greater improvement than the control group which means that application of Myofascial release technique was more effective than using Ultrasound therapy. However, in current study, conclusion and inference is that within group both techniques that are applied showed significant values ($p < 0.05$). But the immediate improvement in patient's condition was reflected in experimental group. As FFI and VAS showed significant changes after 6th session in experimental group [17].

Another study conducted by Hemlata et al. (2007) was randomized controlled trial (RCT) including the patients of plantar fasciitis, in which experimental group received general protocol of physical therapy with Myofascial release and control group received general protocol only (therapeutic ultrasound, contrast bath, foot intrinsic muscle strengthening exercises plantar fascia and TA stretching exercise). Results of the study concluded that group A which received the general protocol with Myofascial release is more effective than Group B. whereas current study concluded ultrasound along with stretching exercises (calf stretch, plantar

fascia stretch, and self-stretch of both calf muscle and plantar fascia) as a treatment regime in general protocol that is applied over both groups (experimental and control) with the exception of Myofascial release technique that is applied as a treatment approach only over the patients enrolled in experimental group. Our study's results were experimental group showed more frequent and immediate results as compared to control group with the p-value of ($p < 0.05$) at the midline of the treatment (3rd session) and at the end of the treatment sessions (6th session) with p value=0.00 [18].

Another RCT study was conducted by Adeela and colleagues (2012) in order to compare the effectiveness of therapeutic ultrasound v/s Myofascial release technique for treating plantar fasciitis. Functional foot index and visual analog scale were used as a measuring tool. Experimental group was treated with Myofascial release technique while ultrasound therapy was applied over the patients in the control group. Conventional exercises were same in both groups. Outcome measures were taken on the first- & tenth-day using VAS for pain intensity & FFI for functional outcome. Chi-square test was used. 60 Subjects were divided into two groups & their Statistical value for the VAS on first day was also not significant for both groups ($p = 0.981$) while on 10th day both groups showed statistically significant difference in reduction of pain on VAS with p-value ($p = 0.023$) but intergroup analysis showed that group B values are statistically more significant. Results of study concluded that Myofascial release technique had significant effect to improve pain in patients of plantar fasciitis. Whereas in current study, results between the groups and within the group showed more significant, frequent and immediate changes with the reduction of percentage in values of FFI and VAS of those patients that were enrolled in experimental group and treated with Myofascial release technique along ultrasound and stretching exercises. There was also the difference of study conducted by Adeela and colleagues (2018) on the basis of allocating treatment regimes in experimental and control group. Current study was followed by application of ultrasound in both groups while the study that was done by Adeela (2018) followed by application of ultrasound only to the control group. Also, there were only 06 sessions and mean with standard deviation at the end of the treatment showed statistically significant values with $p < 0.05$ [19].

The limitations of the current study are that the population was selected specifically from the physical therapy department of Pakistan institute of medical sciences Islamabad (PIMS) and Mega medical complex Rawalpindi. Collection of data was done within a very short time as per the availability of the patient and time allocated by the relevant departments. A small sample size of 30 patients was selected as the difficulty is in follow up sessions by the patients. Current study involves the sessions on alternative days as per concern with the patient's ease. Due to high incidence of plantar fasciitis in women as compared to men, hence Females are greater in number among sample size as per frequently reporting to the clinical settings.

CONCLUSION

According to statistical analysis and Findings from this study it is concluded that Myofascial release technique along conventional physical therapy decrease pain and improve functional ability in the patients suffering from plantar fasciitis, as measured by the functional foot index and visual analogue scale. Regarding Myofascial release, it is also necessary to educate the patient properly about do and don'ts (as per plantar fasciitis) as it is helpful in preventing pain, depression and improving quality of life in patients thereby minimizing postural deformity, chronic stress, improving functional status and activities of daily living.

RECOMMENDATION

It is recommended that wide number of sample size must also assess to evaluate the efficacy of the technique. It is also recommended that future researches must be done while taking in account the treatment sessions for consecutive days to assess the more frequent changes of Myofascial release technique, as current study was done with the sessions on alternative days. Future researches should also focus over male population affected by plantar fasciitis.

Conflict of interest

The authors declare that there is no conflict of interest.

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The present study did not receive any funding from local or international organization.

AUTHOR CONTRIBUTION

AJ contributed to the formulation of concepts and design of the study, statistical analysis, writing and revising of manuscript. RR contributed to the design of the study, writing and revising of manuscript. IK contributed to the writing and revising of manuscript. NK, HJ, ST, IR contributed to providing advice on data collection and revising of manuscript.

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