

## EFFECTS OF MYOFASCIAL RELEASE AND ERGON TECHNIQUE ON FOOT FUNCTION AND BALANCE IN PLANTAR FASCIITIS

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### ABSTRACT

**Background:** The plantar fascia is a thick and fibrous connective tissue structure and is located at the metatarsophalangeal joints of each toe and the medial tuberosity of the calcaneus. Chronic micro-trauma and overuse injuries to the foot's plantar surface are the root causes of plantar fasciitis.

**Purpose:** The purpose of the present study is to compare the effects of Myofascial Release and Ergon Technique on foot function and balance in Planter Fasciitis.

**Methodology:** Eighteen males and females with morning heel-pain(unilateral), aged 30 to 50 years having positive Windlass test participated in this study. Both Groups A and B have 9 participants. The study was conducted in Physical Therapy Clinic, Rehab Max, Layyah. For a period of six months. Group A Received Myofascial Release, while Group B received Ergon Technique. The therapeutic ultrasound was used as baseline treatment in both groups. Foot function and foot balance were assessed using Foot Function Index, and Berg Balance Scale respectively at baseline, 3<sup>rd</sup> week, and 6<sup>th</sup> week. Data was analyzed using SPSS version 27.

**Results:** The findings of study showed improvement in both groups, but Group A (Myofascial Release) showed more significant result than Group B (Ergon Technique). The results of intragroup analysis (Friedman test) and intergroup analysis (Mann-Whitney U test) obtained value is ( $p < 0.05$ ) for all variables.

**Conclusion:** Study findings suggest that Myofascial Release Technique showed more significant results compared to Ergon Technique for foot function and balance.

**Keywords:** Foot, plantar fasciitis, pain, balance, Myofascial release

## INTRODUCTION

The plantar fascia is located at the metatarsophalangeal joints of each toe and the medial tuberosity of the calcaneus, the plantar fascia is a thick and fibrous connective tissue structure. The medial, lateral, and central bands make form the foot's metatarsal tunnel, with the latter two typically being the larger and serving crucial biomechanical roles as the foot's longitudinal plantar arch supports (1). Chronic micro-trauma and overuse injuries to the foot's plantar surface are the root causes of plantar fasciitis, a painful and debilitating degenerative disorder of the plantar fascia. The majority of people who have discomfort in their plantar heels suffer from plantar fasciitis, which affects an estimated 7% of the population (2). In non-athletes, plantar fasciitis is more likely to develop if they have restricted ankle dorsiflexion, a body mass index (BMI) of 27 or higher (odds ratio = 3.7), and if they are on their feet for long periods of time during the day. In those who aren't athletes, a lack of ankle dorsiflexion is the biggest risk factor, according to one research. Over-pronation occurs when the ankle cannot fully extend, which puts additional strain on the plantar fascia. Runners and soldiers are among the more active persons who can have plantar fasciitis, but the association between obesity and the illness is less in these groups. Because the plantar fascia undergoes a normal elastic stretch-shortening cycle—repetitive strain can lead to an overuse injury—the issue is more common among runners and those who spend a lot of time on their feet (3). For long-term difficulties that lead to restricted and tight muscles and other soft tissues, myofascial release (MFR) can be a

lifesaver. Eliminating the fascia's excessive pressure on the pain-sensitive tissue and restoring normal alignment are both achieved with myofascial release therapy, which involves changing the viscosity of the ground material to a more fluid condition. Therefore, the goal of this method is to help alleviate Plantar Fasciitis (4). The Ergon Technique increases fibroblastic activity and number, and fibronectin activity through localized inflammation, when strokes are delivered to damaged or compromised tissue. Collagen is a component of the extracellular matrix, and its manufacture and realignment are aided by activated fibroblasts and fibronectin. Research has shown that IASTM can improve joint mobility, soft tissue function, and pain levels. One possible explanation for the persistence of degenerative tissue disorders like tendinosis and fasciitis after IASTM is that the procedure creates controlled micro-trauma in the afflicted tissues, which triggers the inflammatory response once again. Some have even speculated that controlled micro-trauma to damaged tissue could influence the rebuilding and maturation of that tissue (5). To the best of our knowledge, there has been limited research done to analyze the long-term impacts of ergon technique, moreover no trial has reported the outcomes of ergon technique on balance in plantar fasciitis. So, this study will assist the physiotherapist by providing clinical insights on long term effects of ergon technique on foot function and balance for treating plantar fasciitis. Vijay Kumar Hatti et al. in 2023 conducted A study was conducted to investigate the treatment of chronic plantar fasciitis using platelet-rich plasma therapy. The research involved 30 participants, all aged 18 or above. Pain

levels were assessed using the American Orthopedic Foot and Ankle Society (AOFAS) and Visual Analog Scale (VAS) at intervals of two, six, twelve, and twenty-four weeks. At the end of the 24-week period, participants were evaluated based on their exercise frequency and pain status, resulting in three outcome categories: excellent, very good, and poor. After six months of follow-up, the PRP group experienced a decrease in mean Visual Analog Scale from 8.4 to 3.3 and in mean American Orthopedic Foot and Ankle Society from 27.66 to 50.93. There were statistically and medically significant improvements in short-term functional outcome ratings, restoration of plantar fascia thickness, and visual analog scale scores for heel pain in individuals with chronic plantar fasciitis, according to this study's findings (6). Ajay Mahato et al. in 2023 conducted a study to assess the effectiveness of dextrose prolotherapy in managing chronic plantar fasciitis. The trial comprised 66 individuals who were followed up after 12 weeks and who had two injections of prolotherapy spaced two weeks apart. We recorded and analyzed the patients' pre- and post-test clinical data (Visual Analog Scale for resting and active pain), functional data (Foot Function Index), and ultra-sonographic results (plantar fascia thickness). Women made up 39 patients, or 59.1%, while men accounted for 27 patients, or 40.1%. Their ages varied from 26 to 68 years old, with 43.91 being the mean and 10.225 being the standard deviation. Prolotherapy produced notable improvements on the clinical scores (Visual Analog Scale-R and Visual Analog Scale-A), functional score (Foot function index), and ultra-sonographic findings (plantar fasciitis thickness).

Results from studies on plantar fasciitis pain, functional results, and patient satisfaction all point to Prolotherapy as a safe, cost-efficient, and highly successful treatment module (7). Ana Paula et al. in 2022 A study was conducted to investigate the short- and long-term therapeutic effects of conservative treatment in women with plantar fasciitis. The treatment involved combining a custom foot-bed with minimalist flexible shoes, compared to using the shoes alone in a gait-training program. All 36 participating women were randomly assigned to two groups: those without acute Plantar fasciitis and those with it. Patients with Plantar fasciitis in the intervention groups received either minimalist flexible shoes (SG) or a combination of both shoes and bespoke orthopedic insoles (CIG) on the first day. These shoes were an essential component of the gait-training program, which patients wore continuously for three and six months. Patients in the control group (CG) did not receive specialized care but were provided with standard instructions, including shoe recommendation (8).

Recent literature focused on the use of injections, dry needling, kinesio taping, ischemic compression, TENS, and static stretching with their short-term therapeutic effects on plantar fasciitis. To our knowledge there is no research available on long term effects of myofascial release and ergon technique. Moreover, balance is the least discussed outcome variable related to plantar fasciitis with these interventions. So, the primary objective of this study was to explore the enduring impacts of Myofascial Release and Ergon Technique on foot function and balance among individuals suffering from plantar fasciitis.

To compare the effects of myofascial release and ergon technique on foot function and balance in planter fasciitis.

## METHODOLOGY

This study was conducted at Rehab Max in Layyah. This was a randomized clinical trial study design employed to compare the results of the study with a Non-Probability Purposive Sampling Technique was utilized to select the participants. The study included participants of both genders. A total of 18 participants were included in this study.

The following inclusion criteria were applied:

- Age 30-50 years
- Both Gender
- Positive Windlass test
- Pain in the morning when taking the first steps or after prolonged rest

The following exclusion criteria were considered:

- Individuals with a history of lower limb trauma
- Any systemic illness, like rheumatism, arthritis
- A fracture below the knee during the preceding year
- Prior foot surgery
- A positive diagnosis of fat pad syndrome or tarsal tunnel syndrome were excluded

## Data Collection Procedure

### SCREENING

The Subjects who met the inclusion criteria was allocated for this study.

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### RANDOMIZATION

The concealed envelope method involves providing sealed opaque envelopes contained details of the treatment regimen to participants. When a patient agreed to participate in the trial, an envelope was opened, and the patient was then offered the treatment regimen allocated to them.

### ASSESSMENT

Data was collected at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week (follow-up).

### INTERVENTIONS

#### Routine Physical Therapy (Baseline Treatment)

The routine physical therapy included ultrasound. Ultrasound was used for 10 minutes (Frequency 3MHz) in each session. Total duration for each session with intervention was 25-30 minutes.

#### Group A: Myofascial Release Technique

The Myofascial Release (MFR) technique, based on the anatomy trains concept, the superficial back line of the lower limb was targeted. Participants were positioned supine with the lower limb extended and the foot dorsiflexed. Myofascial Release (MFR) was applied on the plantar surface using three strokes directly over the skin, with the hand sliding along the dorsiflexion motion while maintaining consistent pressure in the caudocranial direction.

#### Group B: Ergon Technique

Ergon technique have several different options for tools as well as treatment techniques. Now we use Graston tool while patient in prone position scan the tissue and point of fibrosis or any sort of restriction in gastrocnemius. Use the tool all the way down in

sweeping motions feelings for restrictions from proximal to distal and from up to down at the junction of Achilles. Now ask the patient to do dorsiflexion while scooping Achilles tendon from insertion to origin.

### Ethical Consideration

The rules and regulations set by the ethical committee of Government College University Faisalabad Layyah Campus was followed while conducting the research and the rights of the research participants was respected.

- Written informed consent (attached) was taken from all the participants.
- All information and data collection was kept confidential.
- Participants were remained anonymous throughout the study.
- The subjects were informed that there are no disadvantages or risks on the procedure of the study.
- We were done everything we can to protect your privacy. Your identity will not be revealed in any publication resulting from this study.
- Your participation in this research study was voluntary. You might choose not to participate, and you may withdraw your consent to participate any time. You were not penalized in any way should you decide not you participate or to withdraw from this study.

## RESULTS

**Table 1: Age of Participants**

Groups	Age
	Mean $\pm$ SD
Group-A (Myofascial release technique)	35.67 $\pm$ 3.50
Group-B (Ergon technique)	41.33 $\pm$ 4.717

The table described the descriptive statistics of age, the lower limit of age was 30 years, and the upper limit was 50 years. For Group-A, the respondent's age had mean value of 35.67  $\pm$  3.50, while for Group-B had mean of 41.33  $\pm$  4.717.

**Table 2: Gender Distribution**

Variable		Group A (Myofascial release technique)	Group B (Ergon technique)
Gender	MALE	4(44%)	4(44%)
	FEMALE	5(56%)	5(56%)

The above table described the group wise comparison between males and females. The group A had male ratio 44%, while female ratio for group A was 56%. Similarly, Group B had total size of 9 in

which 4 were males and 5 were females with ratio of 44% and 56% respectively.

**Table 3: Table of Effected Side Statistics**

Variables		Myofascial release technique	Ergon technique
Effected Side	Right Side	5(56%)	5(56%)
	Left Side	4(44%)	4(44%)

The above table described the group wise comparison between Right Side and Left Side. The Group A had Right Side ratio 56%. While Left Side ratio for Group A was 44%. Similarly, Group B had 5 individuals having Right Side Effected and 4 individuals having Left Side effected with ratio 56% and 44%, respectively.

**Table 4: Normality test (Foot Function Index)**

Variables		Shapiro-Wilk		
		Statistics	df	Sig.
Total FFI Scorings	At baseline	0.890	18	0.039
	At 3 <sup>rd</sup> week	0.882	18	0.028
	At 6 <sup>th</sup> week	0.809	18	0.002
Pain intensity in morning upon taking first step	At baseline	0.788	18	0.001
	At 3 <sup>rd</sup> week	0.892	18	0.041
	At 6 <sup>th</sup> week	0.888	18	0.036
Pain intensity when walking	At baseline	0.803	18	0.002
	At 3 <sup>rd</sup> week	0.870	18	0.018
	At 6 <sup>th</sup> week	0.895	18	0.047

Pain intensity when standing	At baseline	0.848	18	0.008
	At 3 <sup>rd</sup> week	0.848	18	0.008
	At 6 <sup>th</sup> week	0.896	18	0.049
How is your pain at the end of the day	At baseline	0.803	18	0.002
	At 3 <sup>rd</sup> week	0.848	18	0.008
	At 6 <sup>th</sup> week	0.873	18	0.020
How severe is your pain at its worst	At baseline	0.807	18	0.002
	At 3 <sup>rd</sup> week	0.854	18	0.010
	At 6 <sup>th</sup> week	0.895	18	0.047
Difficulty when walking in the house	At baseline	0.802	18	0.002
	At 3 <sup>rd</sup> week	0.873	18	0.020
	At 6 <sup>th</sup> week	0.895	18	0.047
Difficulty when walking outside	At baseline	0.803	18	0.002
	At 3 <sup>rd</sup> week	0.889	18	0.037
	At 6 <sup>th</sup> week	0.880	18	0.026
Difficulty when walking four blocks	At baseline	0.726	18	<0.001
	At 3 <sup>rd</sup> week	0.882	18	0.028
	At 6 <sup>th</sup> week	0.877	18	0.023
Difficulty when climbing stairs	At baseline	0.741	18	<0.001
	At 3 <sup>rd</sup> week	0.826	18	0.004
	At 6 <sup>th</sup> week	0.862	18	0.013
Difficulty when descending stairs	At baseline	0.816	18	0.003
	At 3 <sup>rd</sup> week	0.871	18	0.018
	At 6 <sup>th</sup> week	0.880	18	0.026
Difficulty when standing	At baseline	0.807	18	0.002
	At 3 <sup>rd</sup> week	0.871	18	0.019

tip toe	week			
	At 6 <sup>th</sup> week	0.881	18	0.027
Difficulty when getting up from a chair	At baseline	0.638	18	<0.001
	At 3 <sup>rd</sup> week	0.894	18	0.045
	At 6 <sup>th</sup> week	0.887	18	0.035
Difficulty when climbing curbs	At baseline	0.801	18	0.002
	At 3 <sup>rd</sup> week	0.870	18	0.018
	At 6 <sup>th</sup> week	0.877	18	0.023
Difficulty when running or fast walking	At baseline	0.705	18	<0.001
	At 3 <sup>rd</sup> week	0.836	18	0.005
	At 6 <sup>th</sup> week	0.872	18	0.019
Use an assistive device (cane, walker, crutches, etc.) indoors	At baseline	0.814	18	0.002
	At 3 <sup>rd</sup> week	0.870	18	0.018
	At 6 <sup>th</sup> week	0.854	18	0.010
Use an assistive device (cane, walker, crutches, etc.) outdoors	At baseline	0.753	18	<0.001
	At 3 <sup>rd</sup> week	0.897	18	0.050
	At 6 <sup>th</sup> week	0.826	18	0.004
Limit physical activities	At baseline	0.789	18	0.001
	At 3 <sup>rd</sup> week	0.891	18	0.040
	At 6 <sup>th</sup> week	0.886	18	0.033

After applying test of normality, the results of Shapiro-Wilk showed that p values <0.05 so, data was not normally distributed. Therefore, data was non-parametric.

#### 4.1: Normality test (Berg Balance Scale)

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After applying test of normality, the results of Shapiro-Wilk showed that p values <0.05 so, data was not normally distributed. Therefore, data was non-parametric.

#### 4.2: Group-A Friedman Test (Foot Function Index)

The described within the groups analysis through Friedman test. The values of median IQR, mean ranks and p-value of group A were mentioned. Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

#### 4.3: Group-A Friedman Test (Berg Balance Scale)

The described within the groups analysis through Friedman test. The values of median IQR, mean ranks and p-values of group A were mentioned. Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

#### 4.4: Group B Friedman Test (Foot Function Index)

The described within the groups analysis through Friedman test. The values of median IQR, mean ranks and p-values of group B were mentioned. Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

#### 4.5: Group B Friedman Test (Berg Balance Scale)

The described within the groups analysis through Friedman test. The values of median IQR, mean ranks and p-values of group B were mentioned. Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

#### 4.6: Inter Group Analysis (Mann Whitney Test) Foot Function Index

The described between groups analysis through Mann Whitney Test. The values of median IQR, mean ranks and p-values were mentioned.

Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

#### **4.7: Inter Group Analysis (Mann Whitney Test) Berg Balance Scale.**

The described between groups analysis through Mann Whitney Test. The values of median IQR, mean ranks and p-values were mentioned.

Assessment had been done at baseline, 3<sup>rd</sup> week and 6<sup>th</sup> week.

## **DISCUSSION**

The present research explored the impact of Myofascial Release Technique (MFR) and Ergon Technique on enhancing foot function and balance among individuals with Plantar Fasciitis. Through an array of statistical analyses, including the Friedman test, Mann-Whitney test, and descriptive statistics, noteworthy enhancements were observed in foot function and balance, as measured by the Foot Function Index (FFI) and Berg Balance Scale (BBS). Eighteen individuals, aged between 30 and 50, were divided into two groups: Group A underwent Myofascial Release Technique, while Group B received Ergon Technique. Over a span of 6 weeks, with assessments conducted at baseline, 3<sup>rd</sup> week, and 6<sup>th</sup> week, both groups displayed marked improvement. Notably, the Myofascial Release group exhibited more pronounced improvements in foot function and balance compared to the Ergon group.

Dr. Uzair Tamboli conducted research in 2021, a comparison was made to evaluate the effectiveness of myofascial release combined with lower limb strengthening in treating plantar fasciitis. The research involved randomly assigning subjects into two groups: Group A, receiving manual myofascial release (MFR) protocol, and Group B, receiving both myofascial release and lower limb strengthening (MFR-LLS) protocols. Additionally, both groups received ultrasound therapy alongside their respective treatments. The myofascial release and lower limb strengthening exercises were administered five times a week for four weeks. The study utilized the Foot Function Index and Visual Analogue Scale as outcome measures. The findings indicated that the combination of myofascial release and lower limb strengthening was effective in alleviating plantar fasciitis symptoms, as evidenced by significant improvements in pain reduction and functional status according to the Visual Analogue Scale and Foot Function Index. Despite the differences of treatment protocol and assessment tools, the current study showed parallel findings for improving foot function in patients with plantar fasciitis.

Similarly, M.S. Ajimsha conducted a study in 2014 to evaluate the efficacy of myofascial release in treating plantar heel pain (PHP). A total of sixty-six patients, consisting of 17 males and 49 females, who were diagnosed with plantar heel pain (PHP), were randomly divided into two groups: a Myofascial Release (MFR) group and a control group. Every participant was given a total of 12 therapy sessions, which were spread out evenly over a period of 4 weeks.



The Simple main effects analysis revealed a substantial superiority of the Myofascial Release (MFR) group over the control group in weeks 4 and 12 ( $P < 0.001$ ). Furthermore, a mixed ANOVA analysis showed that there were significant interactions between the group and time factors in relation to changes in Pressure Pain Thresholds (PPT) in the gastrocnemii and soleus muscles, as well as the calcaneus ( $P < 0.05$ ). These data indicate that MFR is more effective than the control intervention in treating Plantar Heel Pain (PHP).<sup>16</sup> Despite the difference of present study in sample size, the findings of the previous study align with improvement in foot function in experimental group. MFR practitioners claim to be clinically efficacious in providing immediate pain relief and to improve physiologic functions that have been altered by somatic dysfunctions. MFR directs force to fascial fibroblasts, as well as indirect strains applied to nerves, blood vessels, the lymphatic system, and muscles. Laboratory experiments suggest that fibroblasts, the primary cell type of the fascia, adapt specifically to mechanical loading in manners dependent upon the strain magnitude, duration, and frequency. In-vitro modeling study demonstrated that treatment with MFR, after repetitive strain injury, resulted in normalization of apoptotic rate, and reduction in production of inflammatory cytokines.

Rahual Tanwar conducted research in 2014 to determine whether Muscle Energy Technique was beneficial in helping people with plantar fasciitis become more flexible in their gastro-soleus complex. Both the group that received Muscle Energy Technique and the one that received Static

Stretching (SS) had their range of motion, discomfort levels, and the Foot Function Index evaluated. Numeric Pain Rating Scale (NPRS), goniometer evaluations, and the Foot Function Index were utilized as outcome measures. Results showed that when comparing the two groups, the Muscle Energy Technique group fared much better than the Static Stretching group.<sup>17</sup> Regardless of difference in interventions on same condition the present study results were parallel with previous study in improving function.

Khadija Nadeem conducted a study where Sixty-four people were randomly assigned to one of two groups: the Ergon group and the control group. Therapeutic ultrasonography, stretching and strengthening exercises, cryotherapy, and extra instrument-assisted soft tissue mobilization were all administered to both groups. Multiple scales were used to measure pain, strength, and mobility. Every single person in the therapy group experienced a notable decrease in discomfort, an increase in strength, and a remarkable expansion of their plantarflexion range of motion ( $p < 0.05$ ). Research like these proves that the Ergon Technique can help alleviate plantar fasciitis symptoms.<sup>18</sup> On the other hand, in current study Ergon technique show less significant results as compared to this study. Regardless of difference of subject size there is difference in baseline intervention.

In summary, the present study contributes to the existing literature by providing evidence for the effectiveness of both Myofascial release and Ergon technique in improving foot function and balance. The result indicates that both interventions lead to significant improvement, with the Myofascial

release group demonstrating more significant effects. These findings align with previous research highlight the efficacy of MFR. The results of this study have implications for healthcare professionals and clinicians involved in the management of foot function and balance in patients with plantar fasciitis, suggesting that both interventions can be considered as viable nonpharmacological approach.

## CONCLUSION

In conclusion, the study findings suggest that both Myofascial release technique and Ergon technique show improvement in foot function and balance. However, MFR demonstrated more significant improvement compared to Ergon technique in term of foot function and balance. These results highlight the potential effectiveness of MFR as therapeutic intervention for foot function and balance.

## LIMITATIONS

- The sample size is relatively small with 9 subjects in each group, which may limit the generalized ability of findings.
- Limited clinical area for the conduction of study involve.
- Small age bracket.

## RECOMMENDATION

- Further research can be done by using different outcome variables.
- In future, research should be conducted to explore the effects of Myofascial release technique and Ergon technique on any other body part.

- Future studies should carry out to assess foot function and balance by different screening tools and instruments.

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