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Effect of myofascial release with lower limb strengthening on plantar fasciitis

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Abstract

Materials and Methodology: Both male and female patients with previously diagnosed plantar fasciitis and having symptoms such as painful first step in the morning, calcaneal soreness on palpation were included in the study and patients with ankle or foot surgery, lower limb spasticity were excluded from the study. A comparative study was done where the subjects were randomly divided into 2 groups – Group A Myofascial Release group (MFR) who received manual myofascial release protocol and Group B Myofascial Release and Lower Limb Strengthening (MFR-LLS) group who received lower limb strengthening protocol in addition to same MFR protocol. Both groups were given Ultrasound Therapy in addition to their respective protocol. Myofascial Release and Lower Limb Strengthening Exercises was given to the patient 5 times a week for 4 weeks. Outcome Measure were Foot Function Index and Visual Analogue Scale. Myofascial release with lower limb strengthening was effective in the treatment of plantar fasciitis. There were significant changes on the Visual Analogue Scale and Foot Function Index. According to the results of data analysis it was found that myofascial release is significantly effective when given with lower limb strengthening program for reducing pain and improving the functional status in subjects with Plantar Fasciitis.

Keywords: Plantar fasciitis, aerobic, lower limb strengthening, obesity, visual analogue scale, foot function index

1. Introduction

Plantar Fasciitis also known as heel pain is the most commonly treated condition by Health care providers [7, 2]. Approximately 2 million Americans are treated for plantar fasciitis [3, 7] and it is the leading cause of treatment for foot and ankle pathologies [11, 21]. Plantar fasciitis has a negative impact on foot-specific and general health-related quality of life [1, 7]. Plantar fasciitis occurs as a sharp insidious pain under the heel and along the medial border of plantar fascia up to its insertion at the calcaneus. Pain gets worse in the morning, for first few steps after getting out of bed, prolonged period of inactivity, or at Beginning of workout [22]. Diagnosis for plantar fasciitis can be made through patient history, clinical assessment, and foot questionnaire, objective assessment such as pain level, palpation, muscle tightness, joint ROM or muscle strength. In addition diagnostic imaging can also be done to exclude other causes of heel pain [23, 24]. There are many different types of approaches used by clinicians for this condition. There is a risk of developing Antalgic gait as the patient avoids weight bearing on symptomatic foot [25]. Lack of walking and avoidance of weight bearing could result in loss of muscle strength and flexibility [26, 23]. Development of Abnormal Biomechanical structure is a risk factor in plantar fasciitis. In 2015 Sullivan *et al.* [27] has identified the musculoskeletal problems occurring in plantar fasciitis and found that there is weakness in various muscles such as ankle evertors and toe flexor. There are very few studies that show effects of Strengthening on plantar fasciitis pain. It is still not clear whether plantar fasciitis comes under cumulative trauma disorders. There are studies that show the risk factors for plantar fasciitis. The condition is more likely to occur in persons who are obese and those who are on their feet most of the day [28]. High level of physical activity and standing for a long duration has an impact on one's musculoskeletal system. Security Guards at any place are required to stand for most of their time. This prolonged standing in addition with higher BMI is major factor for developing Plantar Fasciitis. Hence this study was undertaken to investigate the effects of Myofascial Release with Lower Limb Strengthening for Security Guards having plantar

fasciitis. The Hypothesis of this study was that Myofascial Release with lower limb strengthening may have a positive effect on plantar fasciitis.

2. Objectives

To find the effect of Myofascial Release with Lower Limb Strengthening in Plantar fasciitis

3. Materials and Method

The study was conducted in outpatient department of Krishna College of physiotherapy. Subjects were selected according to the inclusion and exclusion criteria. The study was ethically approved by the Institutional Ethical Committee, KIMS Deemed to Be University, Karad. Written consent of the patient was taken. The subjects underwent pretest using Visual analogue scale and Foot Function Index. The subjects were randomly divided into 2 groups – Group A Myofascial Release group (MFR) who received manual myofascial release protocol and Group B Myofascial Fascial Release and Lower Limb Strengthening (MFR-LLS) group who received lower limb strengthening protocol in addition to same MFR protocol. Both groups were given Ultrasound Therapy in addition to their respective protocol. Myofascial Release and Lower Limb Strengthening Exercises was given to the patient 5 times a week for 4 weeks. Myofascial Release technique was given according to the anatomy trains concept on the superficial back line of lower limb. The subjects are taken in supine position with Lower Limb extended and foot in Dorsiflexion. MFR was given on the plantar surface. The technique was performed in three strokes directly over the patient's skin by sliding the hand throughout the Dorsiflexion with constant pressure in the caudocranial direction. The lower limb strengthening program consists of exercises for muscles of Hip joint, Knee Joint and Ankle Joint. Exercises are performed in 3 sets of 10 repetitions and 10 seconds hold with an interval of 30 seconds between each set.

Hip Joint

Exercises for hip flexors

- This exercise was given for improving the strength of hip flexor muscles.
- Subject was placed in supine position with knee extended of affected side and knee flexed of sound side. The subject performed straight leg raiser with extended knee.

Exercises for hip Abductors

- This exercise was given for improving the strength of Abductor muscles.
- Subject was placed in lateral decubitus position of sound side with knee flexed and performed hip abduction with knee extended of affected side.

Exercises for hip Adductors and Extensors

- This exercise was given for improving the strength of Adductor and Extensor muscles.
- The Subject maintained an orthostatic position and performed Hip Adduction and Hip Extensions.

Knee Joint

- Exercises for Knee Extensors.
- This exercise was given to strengthen the quadriceps muscle.
- Subjects were placed in supine position with legs extended and the towel roll was placed under the knee of

affected leg and they are instructed to press the roll with maximum force.

Exercises for knee Flexors.

- This exercise was given to strengthen the hamstring muscle.
- Subjects were placed in supine position with legs extended and the towel roll was placed under the ankle of affected leg. The subjects were instructed to press the roll with maximum force.

Ankle Joint

- Exercises for Dorsiflexors and Plantar flexors.
- This exercise was given for improving the strength of Ankle Dorsiflexors and Plantar flexors.
- The Subject were asked to sit on the floor with knee extended and instructed to perform
- Dorsiflexion and Plantar flexion using a Theraband of suitable resistance.

Intensity-Training was started during weeks 1 and with intensity 60% (1RM) was progressed to intensity 75%-80% (1RM).

- The subjects in both group then underwent posttest using Visual analogue scale and Foot Function Index Test after the completion of treatment protocol of 4 weeks.
- The data was analyzed by using instat app. Value of independent t test and significance of p value was checked. Results were prepared accordingly.

4. Analysis and interpretation of data

The researcher conducted a study on effects of aerobic exercise versus resistance exercise on BMI in obese patient with type 2DM. For the purpose of this study the researcher collected data on 30 adults of karad city.

4.1 Analysis of data

Data analysis was performed with SPSS version 20.0. Paired t test was done to compare different variables of patients undergoing myofascial release and lower limb strengthening exercises. Following results were obtained.

4.2 Level of significance

There were significant changes on VAS and Foot Function Index in the lower limb strengthening group as compared to myofascial release group. Effectiveness on VAS in both the groups was observed.

Findings of the statistical analysis have been shown in the following tables.

Visual analogue scale

Table 1: Visual Analogue Scale (at rest)

	Group A		Group B	
	Pre	Post	Pre	Post
Mean	1.94	0.6666	1.76	0.9266
SD	0.9891	0.1175	0.7008	0.6017

- The above table shows the results of VAS in pretest and posttest for both groups.
- In the pretest (of rest) group A has the mean and SD of 1.94 and 0.9891 respectively.
- In posttest had a mean and SD of 0.6666 and 0.1175 respectively.
- In the pretest (of rest) group B has the mean and SD of 1.76 and 0.7008 respectively.

- In the posttest had a mean and sd of 0.9266 and 0.6017 respectively.
- There is extremely significant result in pre-test and post-test of visual analogue scale with p value <0.0001, t value 10.074 (at rest).

Table 2: Visual Analogue Scale (on Activity)

	Group A		Group B	
	Pre	Post	Pre	Post
Mean	4.7133	2.3666	5.2733	1.54
SD	1.64	1.185	2.121	0.7799

- The above table shows the results of VAS in pretest and posttest for both groups.
- In the pretest (on activity) group A has the mean and SD of 4.7133 and 1.64 respectively.
- In the posttest had a mean and sd of 2.3666 and 1.185 respectively.
- In the pretest (on activity) group B has the mean and SD of 5.2733 and 2.121 respectively.
- In the posttest had a mean and SD of 1.54 and 0.7799 respectively.
- There is extremely significant result in pre-test and post-test of visual analogue scale with p value <0.0001, t value 13.752 (on activity).

4.3 Foot Function Index

Table 3: Foot Function Index

	Group A		Group B	
	Pre	Post	Pre	Post
Mean	144.2	36.5333	119.466	40.266
SD	13.078	4.34	22.791	7.096

- The above table shows the results of integrated Foot Function Index in pretest and posttest for both groups.
- In the pretest group A has the mean and SD of 144.2 and 13.078 respectively.
- In the posttest had a mean and SD of 36.5333 and 4.34 respectively.
- In the pretest group B has the mean and SD of 119.466 and 22.79 respectively.
- It is extremely significant for pre-test and post-test Foot Function Index Test with p value <0.0001 and t value 30.091 for pain scale, p value <0.0001 and t value 18.099 for disability scale, p value <0.0001 and t value 21.369 for activity limitation.

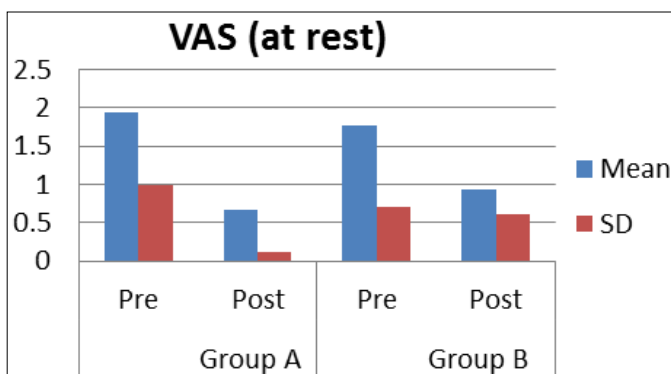


Fig 1: Visual Analogue Scale (at rest)

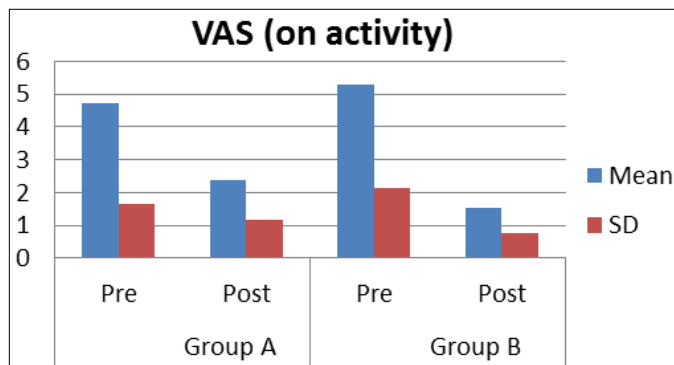


Fig 2: Visual Analogue Scale (on activity)

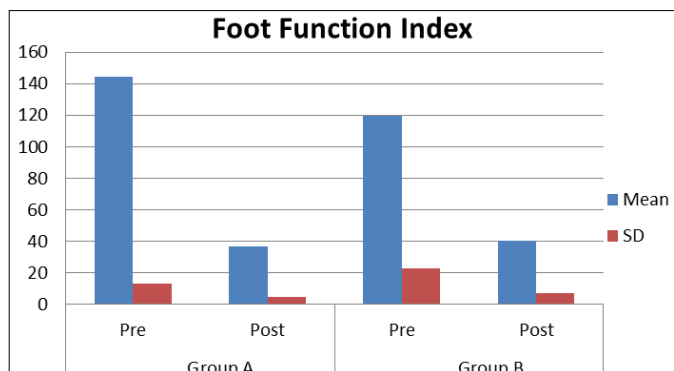


Fig 3: Foot Function Index

5. Discussion on findings

The aim of this study was to find out the effect of myofascial release with lower limb strengthening on plantar fasciitis. This study was done on security guards of Krishna hospital. Both male and female security guards suffering from plantar fasciitis were included. 30 security guards of age group of 25 to 45 were selected for the study. The mean of the age group was found as 35. It is shown in previous studies that age can be the risk factor for males with age group of 25 to 35 had increased risk for injury of any type. Standing for prolonged time is also considered as the major risk for plantar fasciitis and it is common in security guards. Obesity is also considered as risk factor for plantar fasciitis. According to the sample males (25) involved were more as compared to the females (5). In previous study about combination of hip strengthening and manipulative therapy for treatment of plantar fasciitis by Bruno Dos Santos concluded that hip strengthening combined with manipulative therapy reduced pain intensity and increased strength of hip muscles in patients with plantar fasciitis. Positive results of this study shows that muscles strengthening contribute to the improvement pain intensity in plantar fasciitis patients. So it is important to find out if strengthening of all major joint of lower is useful in reducing pain intensity and increase functional independency. Two outcome majors were selected to cover these two components. There is a risk of developing Antalgic gait as the patient avoids weight bearing on symptomatic foot [25]. Lack of walking and avoidance of weight bearing could result in loss of muscle strength and flexibility [26, 23]. Development of Abnormal Biomechanical structure is a risk factor in plantar fasciitis. In 2015 Sullivan *et al.* [27] has identified the musculoskeletal problems occurring in plantar fasciitis and found that there is weakness in various

muscles such as ankle evertors and toe flexor. There are very few studies that show effects of Strengthening on plantar fasciitis pain. Visual analogue scale (VAS) was taken to determine the pain in subjects. In pretest the mean of the first component of VAS i.e. at rest was 1.8 and mean of the second component i.e. on activity was 4.9933. According to inclusion criteria patients who have pain on first step in the morning and calcaneal soreness on palpation. Paired t test was performed to compare the results of pre and posttest. It shows very significant result when pre and post components of at rest were compared with p and t values of <0.0001 and 10.074 respectively. It is extremely significant in on activity with p and t values of <0.0001 and 13.752 respectively. Foot function index was used to determine the functional stability. It diagnosed the foot in three different components as pain scale, disability scale and activity limitation. The mean of Pain Scale component in pre and posttest is 62.4333 and 14.5666 respectively. The p value and t value are found as <0.0001 and 30.091 respectively which is extremely significant. The Disability scale measured mean of 39.8333 and 16.8 for pre and posttest respectively. Paired t test was performed to compare the values of pre and posttest. In the post test data analysis it was found very significant with p and t values as <0.0001 and 18.09 respectively and found to be extremely significant. Activity limitation was also found to be extremely significant with p and t value of <0.0001 and 21.396 respectively. Mean of the pre and posttest is found as 29.4666 and 11.8 respectively. The MFR was given along with conventional physiotherapy program i.e. superficial heating, mobilization, isometric exercises and stretching regime and it was found effective for relieving the pain and improving the functional status in patients with plantar cases.

6. Conclusion

According to the results of data analysis it was found that myofascial release is significantly effective when given with lower limb strengthening program for reducing pain and improving the functional status in subjects with Plantar Fasciitis.

7. Limitations and suggestion

The study was conducted in limited period of time. The study was conducted in a small population in limited area. The samples consist of less female subjects. This study can be done with more advance outcome measures. Study can be conducted in different occupational areas.

Conflict of interest: None

Source of funding: None

Ethical clearance

Ethical clearance obtained from the Institutional Ethical Committee, KIMS Deemed to Be University, Karad.

8. References

1. Martin RL, Davenport TE, Reischl SF. Heel pain-plantar fasciitis: revision 2014. *J Orthop Sports Phys Ther* 2014;44(11):A1-33. [PubMed] [Google Scholar]
2. Combination of Hip Strengthening and Manipulative Therapy for the Treatment of Plantar Fasciitis: A Case Report. Bruno Dos Santos, MSc, a Leticia Amaral Corrêa, PT, b Luciano Teixeira Santos, PT, MSc, ab Ney Armando Meziat Filho, PhD, a Thiago Lemos, PhD, a and Leandro Alberto Calazans Nogueira, PhD ab.
3. Crawford F, Atkins D, Edwards J. Interventions for treating plantar heel pain. *Cochrane Database Syst Rev*

- 2000;(3):CD000416. [PubMed] [Google Scholar]
 4. Pfeffer G, Bacchetti P, Deland J. Comparison of custom and prefabricated orthoses in the initial treatment of proximal plantar fasciitis. *Foot Ankle Int* 1999;20(4):214-221. [PubMed] [Google Scholar]
 5. Ajimsha MS, Binsu D, Chithra S. Effectiveness of myofascial release in the management of plantar heel pain: a randomized controlled trial. *Foot (Edinb)* 2014;24(2):66-71. [PubMed] [Google Scholar]
 6. Saban B, Deutscher D, Ziv T. Deep massage to posterior calf muscles in combination with neural mobilization exercises as a treatment for heel pain: a pilot randomized clinical trial. *Man Ther* 2014;19(2):102-108. [PubMed] [Google Scholar]
 7. Renan-Ordine R, Albuquerque-Sendin F, de Souza DP, Cleland JA, Fernández-de-Las-Peñas C. Effectiveness of myofascial trigger point manual therapy combined with a self-stretching protocol for the management of plantar heel pain: a randomized controlled trial. *J Orthop Sports Phys Ther* 2011;41(2):43-50. [PubMed] [Google Scholar]
- (Plantar heel pain has a negative impact on foot-specific and general health-related quality of life) (Patients with plantar heel pain usually report insidious sharp pain under the heel, along the medial border of the plantar fascia to its insertion at the medial tuberosity of the calcaneus, upon weight bearing after a period of non-weight bearing.)
8. Cleland JA, Abbott JH, Kidd MO. Manual physical therapy and exercise versus electrophysical agents and exercise in the management of plantar heel pain: a multicenter randomized clinical trial. *J Orthop Sports Phys Ther* 2009;39(8):573-585. [PubMed] [Google Scholar]
 9. Celik D, Kuş G, Sırma SÖ. Joint mobilization and stretching exercise vs steroid injection in the treatment of plantar fasciitis: a randomized controlled study. *Foot Ankle Int* 2016;37(2):150-156. [PubMed] [Google Scholar]
 10. Piper S, Shearer HM, Côté P. The effectiveness of soft-tissue therapy for the management of musculoskeletal disorders and injuries of the upper and lower extremities: a systematic review by the Ontario Protocol for Traffic Injury management (OPTIMA) collaboration. *Man Ther* 2016;21:18-34. [PubMed] [Google Scholar]
 11. Shashua A, Flechter S, Avidan L, Ofir D, Melayev A, Kalichman L. The effect of additional ankle and midfoot mobilizations on plantar fasciitis: a randomized controlled trial. *J Orthop Sports Phys Ther* 2015;45(4):265-272. [PubMed] [Google Scholar]
 12. Kamonseki DH, Gonçalves GA, Yi LC, Júnior IL. Effect of stretching with and without muscle strengthening exercises for the foot and hip in patients with plantar fasciitis: a randomized controlled single-blind clinical trial. *Man Ther* 2015 in press. [PubMed] [Google Scholar]
 13. Santos L, Almeida R, Wittmann J, Carmo O, Nogueira L. A utilização da reabilitação e exercícios terapêuticos na síndrome da dor femoropatelar-uma revisão sistemática. *Rev Bras Presc Fisiol Exerc* 2013;7(39):225-236. [Google Scholar]
 14. Cibulka MT, White DM, Woehrl J. Hip pain and mobility deficits-hip osteoarthritis: clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopaedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther* 2009;39(4):A1-25. [PMC free

- article] [PubMed] [Google Scholar] (Clinicians must not overlook the function of the hip muscles at different hip positions, for example the gluteus medius is an abductor when at 0° of flexion (standing) but an external rotator at 90° of flexion (sitting).)
15. Delitto A, George SZ, Van Dillen LR. Low back pain. *J Orthop Sports Phys Ther* 2012;42(4):A1-57. [PMC free article] [PubMed] [Google Scholar]
 16. Lagally KM, Robertson RJ. Construct validity of the OMNI Resistance Exercise Scale. *J Strength Cond Res* 2006;20(2):252-256. [PubMed] [Google Scholar]
 17. Maitland GD. Butterworth-Heinemann; Oxford, UK 1986. *Vertebral Manipulation*. [Google Scholar]
 18. Mulligan B. Plane View Services; Wellington, NZ. *Manual Therapy Nags, Snags, MWMs, etc.* 1999. [Google Scholar]
 19. Beeson P. Plantar fasciopathy: revisiting the risk factors. *Foot Ankle Surg* 2014;20(3):160-165. [PubMed]
 20. Looney B, Srokose T, Fernández-de-las-Peñas C, Cleland JA. Graston instrument soft tissue mobilization and home stretching for the management of plantar heel pain: a case series. *J Manipulative Physiol Ther* 2011;34(2):138-142. [PubMed] [Google Scholar]
 21. Thomas JL, Christensen JC, Kravitz SR, *et al.* The diagnosis and treatment of heel pain: a clinical practice guideline-revision 2010. *J Foot Ankle Surg* 2010;49:S1-S19.
 22. Buchbinder R. Clinical practice. Plantar fasciitis. *N Engl J Med* 2004;350:2159-2166.
 23. Effects of Strengthening and Stretching Exercises on the Temporospacial Gait Parameters in Patients With Plantar Fasciitis: A Randomized Controlled Trial Suthasinee Thong-On, MSc, Sunee Bovonsunthonchai, PhD, [...], and Richard Smith, PhD.
 24. McMillan AM, Landorf KB, Barrett JT, Menz HB, Bird AR. Diagnostic imaging for chronic plantar heel pain: a systematic review and meta-analysis. *J Foot Ankle Res* 2009;2:32.
 25. Goff JD, Crawford R. Diagnosis and treatment of plantar fasciitis. *Am Fam Physician* 2011;84:676-82.
 26. Beeson P. Plantar fasciopathy: revisiting the risk factors. *Foot Ankle Surg*.
 27. Sullivan J, Burns J, Adams R, Pappas E, Crosbie J. Musculoskeletal and activity-related factors associated with plantar heel pain. *Foot Ankle Int* 2015;36:37-45.
 28. Plantar fasciitis: Evidence Based Review of Diagnosis and Therapy Charles cole, MD, Craige Seto, MD, John Gaze wood, MD. University of Virginia School of medicine.