# COMPARISON OF MEDIAL ARCH-SUPPORTING INSOLES AND HEEL PADS IN THE TREATMENT OF PLANTAR FASCIITIS

Melih Malkoc, Ozgur Korkmaz, Adnan Kara, Ismail Oltulu, Ferhat Say
Medipol University Department of Orthopaedics and Traumatology Istanbul, Turkey

# POREĐENJE ULOŽAKA ZA PODUPIRANJE MEDIJALNOG LUKA STOPALA I PETNIH ULOŽAKA U LEČENJU PLANTARNOG FASCITISA

Melih Malkoc, Oygur Korkmaz, Adnan Kara, Ismail Oltulu, Ferhat Say
Katedra za ortopediju i traumatologiju Univerziteta Medipol, Instabul, Turska

Received / Primljen: 09. 09. 2014. Accepted / Prihvaćen: 14. 12. 2014.

## ABSTRACT

*Plantar fasciitis is a disorder caused by inflammation of the insertion point of the plantar fascia over the medial tubercle of the calcaneus. Foot orthotics are used to treat plantar fasciitis. Heel pads medialise the centre of force, whereas medial arch supporting insoles lateralise the force. We assessed the clinical results of the treatment of plantar fasciitis with silicone heel pads and medial arch-supported silicone insoles.*

*We retrospectively reviewed 75 patients with heel pain. A total of 35 patients in the first group were treated with medial arch supporting insoles, and 40 patients in the second group were treated with heel pads. The patients were evaluated with the Visual Analogue Scale (VAS) and the Foot and Ankle Ability Measure (FAAM) at the first and last examinations.*

*The mean VAS score in the first group was 8.6±1,2 (6-10); the FAAM daily activity score was 66.2±16 (41.2-95.0), and the sporting activity score was 45.4±24,4 (0.1-81) before treatment. At the last follow-up in this group, the mean VAS score was 5.3±1,5 (0-9); the FAAM daily activity score was 83,0±15,1 (55,9-100), and the sporting activity score was 73,5±26,2 (25-100). The mean VAS score in the second group was 8,6±0,9 (7-10); the FAAM daily activity score was 66.4±17 (41.4-95.2), and the sporting activity score was 45.8±24,2 (0.8-81, 3) before the treatment. At the last follow-up in this group, the mean VAS score was 5.5±1,2 (0-9); the FAAM daily activity score was 83.4±14,9 (60, 2-100), and the sporting activity score was 73.8±26 (28-100).*

*There was no significant difference in the clinical results of both groups. The force distribution by the use of silicone heel pads and medial arch-supported silicone insoles had no effect on the clinical results of the treatment of plantar fasciitis.*

**Keywords:** *Plantar fasciitis, Medial arch-supporting insoles, Heel pads*

## SAŽETAK

*Plantarni fascitis je poremećaj koji nastaje usled zapaljenja pripoja plantarne fascije za medijalni tuberkulum petne kosti. Za lečenje plantarnog fascitisa se koriste ortoze za stopala. Petni ulošci pomeraju mesto opterećenja ka unutra, dok ulošci za podupiranje medijalnog luka pomeraju mesto opterećenja upolje. Klinički rezultati se bave ispitivanjem lečenja plantarnog fascitisa silikonskim petnim uloškima i silikonskim uloškima za podupiranje medijalnog luka stopala.*

*Retrospektivno je ispitano 75 pacijenata sa bolom u peti. 35 pacijenata u prvoj grupi su lečeni sa uloškima za podupiranje medijalnog luka stopala. 40 pacijenata u drugoj grupi je lečeno petnim uloškima. Pacijenti su ocenjivani pomoću Visual Analogue Scale (VAS) i Foot and Ankle Ability Measure (FAAM) na prvom i na poslednjem pregledu.*

*Pre lečenja, srednja vrednost VAS skora u prvoj grupi je bila 8,6 ± 1,2 (6 - 10), FAAM skora adnevne aktivnosti 66,2 ± 16 (42,1 – 95,0) i skora sportske aktivnosti 45,4 ± 24,4 (0,1 - 81). Srednje vrednosti na poslednjem pregledu VAS skora su iznosile 5,3 ± 1,5 (0 - 9), FAAM skora adnevne aktivnosti 83,0 ± 15,1 (55,9 – 100) i skora sportske aktivnosti 73,5 ± 26,2 (25 - 100). Pre lečenja, srednja vrednost VAS skora u drugoj grupi je iznosila 8,6 ± 0,9 (7 - 10), FAAM skora adnevne aktivnosti 66,4 ± 17 (41,4 – 95,2) i skora sportske aktivnosti 45,8 ± 24,2 (0,8 – 81,3). Na poslednjem pregledu srednja vrednost VAS skora je bila 5,5 ± 1,2 (0 - 9), FAAM skora adnevne aktivnosti 83,4 ± 14,9 (60,2 - 100) i skora sportske aktivnosti 73,8 ± 26 (28 – 100).*

*Nema statistički značajne razlike u kliničkim rezultatima između grupa. Raspodela sile pritiska upotrebom silikonskih petnih uložaka ili silikonskih uložaka za podupiranje medijalnog luka stopala nema uticaj na kliničke rezultate lečenja plantarnog fascitisa.*

**Ključne reči:** *plantarni fascitis, ulošci za podupiranje medijalnog luka stopala, petni ulošci*

DE GRUYTER OPEN

**UDK: 617.586-007.2-76 / Ser J Exp Clin Res 2015; 16 (1): 39-42**
**DOI: 10.1515/SJECR-2015-0006**

**Correspondence:** Ozgur Kormaz, Medipol University
Department of Orthopaedics and Traumatology, Istanbul, Turkey ozkormaz00@yahoo.com

## INTRODUCTION

Plantar fasciitis is a musculoskeletal disorder caused by inflammation of the insertion point of the plantar fascia over the medial tubercle of the calcaneus; the inflammation is followed by degeneration. Clinically, the disorder is characterised by pain in the medial calcaneal area (1, 2). Morning pain is an important diagnostic criteria (3). Intrinsic and extrinsic factors are hypothesised to play an etiological role. Obesity, a decrease in ankle dorsiflexion and plantar arch variations are the leading intrinsic factors in plantar fasciitis (4-10).

Plantar fasciitis causes pain and disability in walking (2, 4, 5). Anatomical shortening causes chronic bone traction by mechanical stimulation (2, 6). Although calcaneal spurs are common, heel pain is not necessary for the diagnosis (7). Plantar fasciitis is generally treated with rest, non-steroidal anti-inflammatory drugs (NSAIDs), stretching of the plantar fascia, physical rehabilitation and heel pads (8). According to Scranton et al. heel pads medialise the centre of force, whereas medial arch-supporting insoles lateralise the force (9).

In our study, we aimed to compare the relationship between the force distribution and the clinical results of the treatment of plantar fasciitis with silicone heel pads and medial arch-supported silicone insoles.

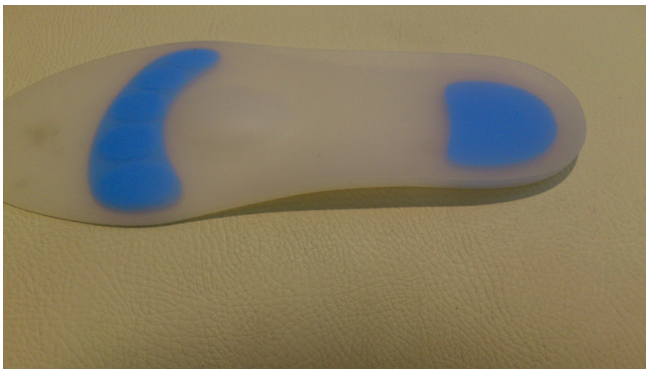

**Figure 1.** Medial arch-supporting insole

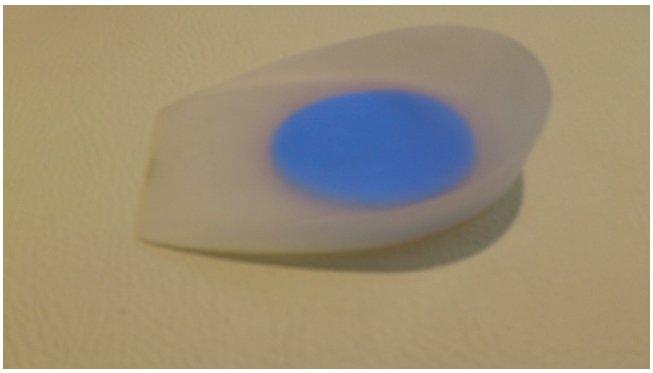

**Figure 2.** Heel pad

## MATERIAL AND METHODS

We received ethical approval for our research from the Medipol University Ethics Committee, under number 10840098-313. We retrospectively reviewed the patients with heel pain, who were admitted to our clinic, the Medipol University Medical School Departments of Orthopaedics and Traumatology. Patients with foot deformities, such as a pes cavus or pes planus deformity, were not included in our study. Patients diagnosed with plantar fasciitis who had received treatment including foot orthotics or a local steroid injection before admission to our clinic were not included in our study. The participants in the study were sedentary, non-athletic patients, and 75 patients were included in our study. The diagnosis of plantar fasciitis was based on the physical examination and radiographic findings. The patients were evaluated with the Visual Analogue Scale (VAS) and the Foot and Ankle Ability Measure (FAAM) (10). The patients were randomly divided into 2 groups. The 35 patients in the first group were treated with prefabricated medial arch-supporting insoles (figure 1), NSAIDs, and stretching exercises. In the first group, 29 patients were female, and 9 patients were male. The mean age was 45,5±10,3 (26-63) years. The mean follow up period was 9,6±1,8 (8-14) months. The 40 patients in the second group were treated with prefabricated heel pads (figure 2), NSAIDs and stretching exercises. In this group, 23 patients were female, and 17 patients were male. The mean age was 50,3±12,5 (28-70) years. The mean follow up period was 9,9±1,3 (8-12) months. Non-steroidal anti-inflammatory drugs were recommended for use as needed, and 75 mg of diclofenac sodium was prescribed for the NSAID therapy. The patients independently performed plantar fascia stretching exercises, which were defined by DiGiovanni et al (11). The patients in both groups were evaluated with the VAS and Foot and Ankle Ability Measure (FAAM) at the last follow-up. A calcaneal spur was detected in 14 patients in the first group and in 19 patients in the second group.

The VAS scores and FAAM scores were statistically compared in both groups before and after treatment. The non-parametric Mann Whitney U test was used to compare the VAS and FAAM scores in the medial arch supporting insole and heel pad treatments. The post treatment VAS and FAAM scores were analysed with the non-parametric Wilcoxon test with 95% confidence interval ($p<0.05$).

## RESULTS

The mean VAS score of all patients was 8.6±1 (6-10). The mean FAAM daily activity score was 66.3±15 (41.2-95.2), and the mean sporting activity score was 45.6±24,2 (0.1-81.3) before the treatment. At the last follow-up, the mean VAS score was 5.4 ±1,5 (0-9); the mean FAAM daily activity score was 83.2±15,3 (55.9-100.0), and the sporting activity score was 73.7±26,2 (25.0-100.0).

The mean VAS score in the first group was 8.6±1,2 (6-10); the mean FAAM daily activity score was 66.2±16 (41.2-95.0), and the mean sporting activity score was

45.4±24,4 (0.1-81) before the treatment. At the last follow-up in this group, the mean VAS score was 5.3±1,5 (0-9); the mean FAAM daily activity score was 83,0±15,1 (55,9-100), and the mean sporting activity score was 73,5±26,2 (25-100). The mean VAS score in the second group was 8,6±0,9 (7-10); the mean FAAM daily activity score was 66.4±17 (41.4-95.2), and the mean sporting activity score was 45.8±24,2 (0.8-81,3) before the treatment. At the last follow-up in this group, the mean VAS score was 5.5±1,2 (0-9); the mean FAAM daily activity score was 83.4±14,9 (60,2-100), and the mean sporting activity score was 73.8±26 (28-100). (Tables 1-2)

One patient in each group reported a total remission of pain after the treatment and a VAS score of 0. There was a statistically significant difference between the pre- and post-treatment VAS and FAAM scores. ($p<0,05$) However, there was no statistically significant difference between the scores of the two groups.

## DISCUSSION

The ethiology of plantar fasciitis is not well understood, and mechanical overloading could be an important factor. Orthoses commonly reduce the tensile forces and demonstrate a therapeutic effect (12, 13)

A relationship between pain and an increased medial longitudinal arch index has been hypothesised. Some studies have reported that the medial longitudinal arch is higher in plantar fasciitis patients, which could be explained by an increase in the plantar arch to maintain the arch structure in the static phase. As this posture is maintained, it causes micro trauma in the plantar fascia (14). In our study, there was no statistically significant clinical difference between the treatment with a medial arch supporting insole and the treatment with a heel pad; our results were not correlated with the hypothesis that an increase in the medial arch index is related to pain.

In plantar fasciitis patients, ankle dorsiflexion is limited, and the flexibility of the triceps surae and toe extension is decreased (15, 16, 17). Thus, release of the medial arch could be helpful in the treatment of plantar fasciitis, and for this reason, we used a medial arch-supporting insole in the first group. However, there was no statistically significant difference between the groups. The significant difference between the pre- and post-treatment scores of the medial arch-supporting insole therapy clinically supports this theory.

Scranton et al showed that heel pads medialise the centre of force, whereas the medial arch supporting insoles lateralise the force (9). We predicted a better clinical result using medial arch-supporting insoles. However, there was no statistically significant difference in the scores, which indicates that the mechanical and clinical studies could differ in terms of the results.

In a study with a population of non-athletes, a low medial arch was detected in 82 patients with a symptomatic calcaneal spur, which was hypothesised to be related to the development of plantar fasciitis (18). Foot deformities play an important role in the ethiology of plantar fasciitis; however, because patients with foot deformities were not included in the study, our study is limited in terms of the relationship between foot deformities and plantar fasciitis.

When thickening of the plantar fascia exceeds 4 mm, it causes pain and a functional limitation (19). The pre-treatment and post-treatment plantar fascia thickness measurements could be an effective method for evaluating the treatment results. The lack of measurement of the thickness of the plantar fascia is another limiting factor of our study.

## CONCLUSION

There was no difference in the clinical results of conservative treatment modalities of plantar fasciitis with heel pads and medial arc-supported insoles. The force distribution by the use of silicone heel pads and medial arch-supported silicone insoles had no effect on the clinical results for the treatment of plantar fasciitis. Both foot orthotics could be used in plantar fasciitis treatment.

**Table 1:** FAAM scores of the two treatment groups

| | Pre-treatment FAAM daily activity score | Pre-treatment FAAM sporting activity score | After treatment FAAM daily activity score | After treatment FAAM sporting activity score |
|---|---|---|---|---|
| Group 1 (medial arch supporting insoles) | 66.2±16 (41.2-95.0) | 45.4±24,4(0.1-81) | 83,0±15,1(55,9-100) | 73,5±26,2(25-100) |
| Group 2 (heel pads) | 66.4±17(41.4-95.2) | 45.8±24,2(0.8-81,3) | 83.4±14,9(60,2-100) | 73.8±26(28-100) |

**Table 2:** VAS scores of the two treatment groups

| | Pre-treatment VAS score | After treatment VAS score |
|---|---|---|
| Group 1 (medial arch supporting insoles) | 8.6±1,2 (6-10) | 5.3±1,5(0-9), |
| Group 2 (heel pads) | 8,6±0,9(7-10) | 5.5±1,2 (0-9) |

## REFERENCES


1. Kwong PK, Kay D, Voner RT, White MW. Plantar fasciitis: Mechanics and pathomechanics of treatment. Clin Sports Med. 1987;7:119-26.
2. Greve JM, Grecco MV, Santos-Silva PR. Comparison of radial shockwaves and conventional physiotherapy for treating plantar fasciitis. Clinics. 2009;64:97-103.
3. Tisdel CL, Donley BG, Sferra JJ. Diagnosing and treating plantar fasciitis: A conservative approach to plantar heel pain. Cleve Clin J Med. 1999;66:231-5.
4. Ogden JA, Alvarez RG, Levitt RL, Johnson JE, Marlow ME. Electrohydraulic high-energy shock-wave treatment for chronic plantar fasciitis. J Bone Joint Surg Am. 2004;86-A(10):2216-28.
5. Huang YC, Wang LY, Wang HC, Chang KL, Leong CP. The relationship between the flexible flatfoot and plantar fasciitis: ultrasonographic evaluation. Chang Gung Med J. 2004 ;27(6):443-8.
6. Roxas M. Plantar fasciitis: diagnosis and therapeutic considerations. Altern Med Rev. 2005 ;10(2):83-93. Review.
7. Onwuanyi ON Calcaneal spurs and plantar heel pad pain. The Foot 2000;10:182-5.
8. Buchbinder R Clinical practice. Plantar fasciitis. N Engl J Med 2004;350:2159–66.
9. Scranton PE Jr, Pedegana LR, Whitesel JP. Gait analysis. Alterations in support phase forces using supportive devices. Am J Sports Med. 1982 ;10(1):6-11.
10. Martin RL, Irrgang JJ, Burdett RG, Conti SF, Van Swearingen JM. Evidence of validity for the Foot and Ankle Ability Measure (FAAM). Foot Ankle Int. 2005;26:968-983.
11. DiGiovanni BF1, Nawoczenski DA, Lintal ME, Moore EA, Murray JC, Wilding GE, Baumhauer JF. Tissue-specific plantar fascia-stretching exercise enhances outcomes in patients with chronic heel pain. A prospective, randomized study. J Bone Joint Surg Am. 2003;85-A(7):1270-7.
12. Kogel GF, Soromodinis SE, Paul JP. Biomechanics of longitudinal arch support mechanics in foot orthoses and their effect on plantar aponeurosis strain. Clin Biomech 1998;11:243-252.
13. Kogler GF, Veer FB, Solomonidis SE, Paul JP. The infl uence of medial and lateral placement of orthotic wedges on loading of the plantar aponeurosis. J Bone Joint Surg Am 1999;81:1403-13.
14. Imamura M, Imamura S, Carvalho AE, Mazagao RA, Cassius DA, Fischer AA. Plantar fasciitis: A new treatment approach. Arch Phys Med Rehabil. 2003;84: E4.
15. Riddle DL, Pulisic M, Pidcoe P, Johnson RE. Risk factors for Plantar fasciitis: A matched case-control study. J Bone Joint Surg Am. 2003; 85-A:872-7.
16. Warren BL. Anatomical factors associated with predicting plantar fasciitis in long-distance runners. Med Sci Sports Exerc. 1984;16: 60-3.
17. Allen RH, Gross MT. Toe flexors strength and passive extension range of motion of the first metatarsophalangeal joint in individuals with plantar fasciitis. J Orthop Sports Phys Ther. 2003;33:468-78.
18. Prichasuk S, Subhadrabandhu T. The relationship of pes planus and calcaneal spurs to plantar heel pain. Clin Orthop Relat Res. 1994;306:192-6.
19. Liang WH, Wang TG, Chen WS, Hou SM. Thinner plantar fascia predicts decreased pain after shock wave therapy. Clin Orthop and Relat Res. 2007;460:219-25.