Original Article

Comparison between shockwave and ultrasound therapy in patients with plantar fasciitis

Riaz Hashmi, Muhammad Sajjad Yousaf, Naveed Arshad, Anam Naz, Maryam Shabbir, Saira Waqar

Syed Medical Complex, Sialkot, Islamabad Medical and Dental College, Riphah University Lahore Campus, University Institute of Rehabilitation, the University of Lahore, Pakistan

Objective: To compare the effects of shockwave therapy with ultrasound and sham taping in patients with plantar fasciitis.

Methodology: This randomized control trial was done at Syed Medical Complex, Sialkot, Pakistan from 1st July to 31st July 2018. A total of 82 patients of planter fasciitis were divided into two groups, treatment and control group. Non probability consecutive sampling was used. Treatment group received shockwave therapy while the control group received ultrasound and sham taping. There were no drop outs thorough out study. The pain intensity was measured with visual analog scale (VAS) and patient specific functional scale (PSFS). Independent sample t test was used between group for comparison and p≤ 0.05 was considered significant.

Results: Mean pain score before treatment of shockwave therapy group was 5.34±0.56 on VAS and 5.44±0.67 in ultrasound group. At end of last session, pain in shockwave therapy group was 1.54±0.67 while at ultrasound group was 2.46±0.64 (p=0.001). Functional scale mean before treatment of shockwave therapy group was 19.24±3.42 while in US and taping was and 16.29±3.84. After the last treatment session PSFS mean was 11.54±3.66 in ultrasound group while in shockwave therapy group was 4.98±2.18 (p=0.01).

Conclusion: Pain decreased and functional activity improved remarkably of patients who received shockwave therapy as compared to those who received ultrasound and sham taping. (Rawal Med J 202;45:834-837).

Keywords: Plantar fasciitis, shockwave, ultrasound.

INTRODUCTION

Plantar fasciitis (PF) is most common cause of heel and foot pain. This inflammation is a repetitive process which causes micro-tears of the plantar fascia from its origin.[1] PF is usually found in running sports.[2] It is particularly found in women with age 40-60.[3] The two most common causes of heel pain are degenerative and mechanical, which result from years of overuse and trauma.[1] Higher prevalence of PF is seen in women and in the obese versus those with a body mass less than 25.[4] It is the most diagnosed condition in the foot and 8% of all injuries.[5]

Old modalities are effective like passing of ions into body in conjunction with traditional modalities and Iontophoresis of dexamethasone.[2] Ultrasound (US) guided extracorporeal shockwave therapy has no effects on pain reduction or improve the functional mobility even if compared with placebo group.[6] Shockwave therapy and autologous blood products had similar chances of providing pain reduction and were better than corticosteroids.[7]

Extracorporeal shock wave therapy (ESWT) was effective for treating PF in middle-aged patients and who were playing recreational sports. ESWT is more effective in patients with pain in the plantar fascia tissue than in patients with pain in the entire plantar fascia.[8] Effectiveness of extracorporeal shock wave therapy is 50-65% without application of local anesthesia.[9] An RCT study was performed and were given two session on 25 patients at 2000 each impulse after gap of one week and it was concluded that radial shockwave therapy successfully treated the chronic PF.[10] This study compared shockwave therapy with ultrasound and taping in treatment of PF.

METHODOLOGY

After approval from ethical committee of the hospital, this randomized controlled trial was

carried out in physiotherapy department of Syed Medical Complex Sialkot, Pakistan from 1st July to 31st July 2018. After informed written consent, 82 patients consecutively with ages 25-50 years, both genders with PF, duration of symptoms more than 1 week and less than 6 weeks and first step upon walking >=3 on visual analog scale (VAS) were taken for the purpose of this study. Patients with bony spur and history of lower limb injuries, spasticity throughout the lower extremity and used an assistive device for ambulation were excluded from study.

The following procedure was used for evaluation of the patients: two groups were made by the help of coin toss method. It made almost 41 patients in experimental group (A) who went through radial shockwave with frequency of 2Hz and energy of 3bar and treatment head size 4mm with current (no. of shocks) of 1000 per session throughout full treatment.[1] Total seven sessions were given and patient was called for follow up after every fifth day. The other 41 control group (B) had ultrasound of 3 MHz set to 1.0 w/cm^2, continuous for 7mins was given to patients, total seven sessions were given after every fifth day follow up. While the tape was simply applied to the skin without forcing external rotation of the calcaneus, not attempted to control or correct the position of the calcaneum.[1]

Pain measurements were done at pretreatment (baseline), at mid and post-treatment using VAS, plantar fasciitis pain scale and patient specific functional scale (PSFS). This useful questionnaire describes specific activity limitation and measure functional outcome for patients, ranges from 0 to 24, and has excellent test-retest reliability, sensitivity to change, and validity).[11] Data collection was done on day one before treatment (baseline) and then after 4th session (at mid) and then after the end of last session (post treatment).

Statistical Analysis: SPSS version 16 was used for analysis. The independent sample t test was employed to check the reduction of pain intensity, increase in patient specific functional scale on both samples including intervention with shockwave therapy and ultrasound, taping before, mid and after treatment. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

Among 82 patients, 37 (45.12%) were male and 45 (54.88%) were female. Total 18 males and 23 females participate in experimental group while the 19 males and 22 females participated in control group respectively. The male and female participation ratio in both groups was approximately same. The mean age of males was 38.59±7.06 while the mean age of female was 38.32±6.6, respectively. Location of pain is reported mostly at bottom of heel which is 34% and at mid sole 33%. Comparison of VAS and PSFS between two groups is shown in Tables 1 & 2. Figure 1 shows, 45% patients were faced difficulty in sleep due to pain, and Figure 2 shows 56% patients have had pain many times a day, respectively.

Table 1. Comparison of pre and post intervention of pain between groups, n = 82.

Visual analogue scale (VAS)	Group A	Group B	t*	P-value
	Mean±SD	Mean±SD		
Baseline readings (S1)	5.34±0.58	5.44±0.67	-0.71	.482
4th session readings (S2)	3.46±0.64	4.32±0.47	-6.90	.001
End of session reading (S3)	1.54±0.67	2.46±0.64	-6.40	.001

Table 2. Comparison of pre and post intervention of patient specific functional scale between groups, n = 82.

Patient specific functional scale (PSFS)	Group A	Group B	t*	P-value
	Mean±SD	Mean±SD		
Baseline readings (S1)	19.24±3.42	16.29±3.84	8.14	.101
4th session readings (S2)	12.22±2.69	13.44±3.62	5.26	.08
End of session reading (S3)	4.98±2.18	11.54±3.66	1.37	.001

Fig 1. Percentages of variable of pain, n = 82.

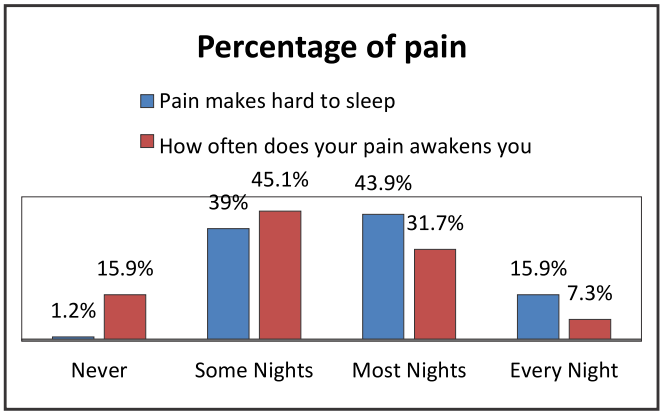
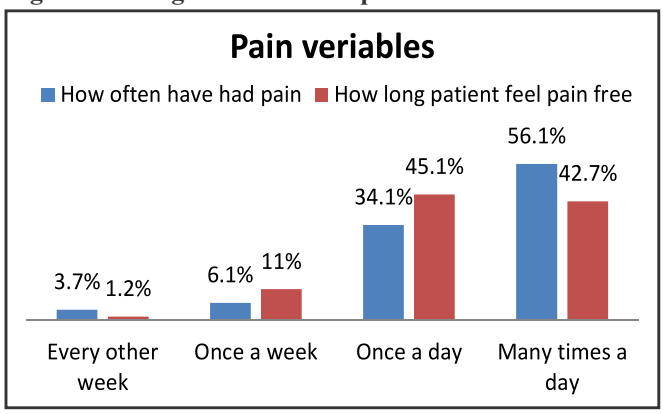


Fig 2. Percentages of variable of pain.



DISCUSSION

The results show that pain of experimental group was at pain S1 mean 5.34±0.58, at pain S2 mean 3.46±0.64 while at pain S3 mean is 1.54±0.67 (p=0.001). The patient specific functional activities of both groups results are for experimental group are at PSFS S1 mean 19.24±3.42, PSFS S2 mean 12.22±2.69, for PSFS S3 4.98±2.18 (p=0.001), respectively. These results show that shockwave therapy puts an important role in reduction of plantar heel pain. The study shows that radial shockwave therapy had significant effects on reduction of pain, increase the functional mobility of patients.

A systematic review compared shockwave therapy with radial shockwave therapy and concluded that both were effective for treatment of PF but radial shockwave therapy was better due to its less price and better effectiveness.[12] Another randomized control trial on 32 participants concluded that radial shockwave therapy was no more effective in PF when compared to conservative treatment like ultrasound, kinesio-therapy and instructions for stretching exercises at home.[13]

This study results contradict to the above results may be it could be due to small sample size included in this study. The cohort study conducted in 2017 by Hanada et al, in which to check effectiveness of shockwave therapy patients were included with different frequency of pain at different levels and different limitations of activity of plantar fasciitis.[8] At the end of study, it was concluded that shockwave therapy not just help in reduction of pain but also cause improvement of specific functional mobility and also activities of daily life mobility.

We strongly recommend that following should be considered by other researchers to advance the quality of research. Sample should belong to diversified group targeted population. Duration of study and frequency of treatment can be increased for better results. Further researches can be focused on PF using different modalities which can be compared to analyze their comparative efficacy. Limitations of this study were as following; there was always possibility of under reporting or over reporting of symptoms by patients. There was possibility that pain might be relieved by other factors like natural recovery and medication. Lack of money was also a limiting factor in this study as this research was not funded by any funding body.

CONCLUSION

Radial shockwave therapy was found to be more effective than ultrasound and taping in management of plantar fasciitis. Most significant improvement was reduction of pain. Furthermore, radial shockwave therapy is also effective in improvement to perform activities of daily life and increase range of motion in ankle joint.

Author Contributions:
Conception and design: Riaz Hashmi
Collection and assembly of data: Muhammad Sajjad Yousaf
Analysis and interpretation of data: Naveed Arshad
Drafting of the article: Meraim Shabbir, Saira Waqar
Critical revision of article for important intellectual content: Anam Naz
Statistical expertise: Naveed Arshad
Final approval and guarantor of the article: Naveed Arshad, Marriam Shabbir
Corresponding author email: Naveed Arshad: oliajann@gmail.com
Conflict of Interest: None declared
Rec. Date: Nov 7, 2019 Revision Rec. Date: Jul 6, 2020 Accept Date: Oct 1,2020

REFERENCES

1. Hyland MR, Webber-Gaffney A, Cohen L, Lichtman SW. Randomized controlled trial of calcaneal taping, sham taping, and plantar fascia stretching for the short-term management of plantar heel pain. J Orthop Sport Phys. 2006;36:364-1.
2. Gudeman SD, Eisele SA, Heidt JR RS, Colosimo AJ, Stroupe AL. Treatment of Plantar Fasciitis by lontophoresis of 0.4% Dexamethasone: A Randomized, Double-Blind, Placebo-Controlled Study. Am J Sport Med. 1997;25:312-6.
3. Roxas M. Plantar fasciitis: diagnosis and therapeutic

considerations. Altern Med Rev. 2005;10:83-9.
4. Nahin RL. Prevalence and Pharmaceutical Treatment of Plantar Fasciitis in United States Adults. J Pain. 2018;19:885-9.
5. Martin RL, Davenport TE, Reischl SF, McPoil TG, Matheson JW, Wukich DK, et al.. Heel pain—plantar fasciitis: revision 2014. J Orthop Sports Phy. 2014;44:1-3
6. Buchbinder R, Ptasznik R, Gordon J, Buchanan J, Prabaharan V, Forbes A. Ultrasound-guided extracorporeal shock wave therapy for plantar fasciitis: a randomized controlled trial. JAMA. 2002;288:1364-7.
7. Hsiao MY, Hung CY, Chang KV, Chien KL, Tu YK, Wang TG. Comparative effectiveness of autologous blood-derived products, shock-wave therapy and corticosteroids for treatment of plantar fasciitis: a network meta-analysis. Rheumatology. 2015;54:1735-9.
8. Hanada M, Takahashi M, Matsuyama Y. The effect of extracorporeal shock wave therapy for the treatment of plantar fasciitis in regard to middle-aged patients' activity level and pain localization. Shock Waves. 2019;29:321-6.
9. Gollwitzer H, Saxena A, DiDomenico LA, Galli L, Bouche RT, Caminear DS, et al. Clinically relevant effectiveness of focused extracorporeal shock wave therapy in the treatment of chronic plantar fasciitis: a randomized, controlled multicenter study. JBJS. 2015;97:701-8.
10. Ibrahim MI, Donatelli RA, Schmitz C, Hellman MA, Buxbaum F. Chronic plantar fasciitis treated with two sessions of radial extracorporeal shock wave therapy. Foot Ankle Int. 2010;31:391-7.
11. Chatman AB, Hyams SP, Neel JM, Binkley JM, Stratford PW, Schomberg A, et al. The Patient-Specific Functional Scale: measurement properties in patients with knee dysfunction. Phys Ther. 1997;77:820-9.
12. Chang KV, Chen SY, Chen WS, Tu YK, Chien KL. Comparative effectiveness of focused shock wave therapy of different intensity levels and radial shock wave therapy for treating plantar fasciitis: a systematic review and network meta-analysis. Arch Phys Med Rehab. 2012;93:1259-8.
13. Greve JM, Grecco MV, Santos-Silva PR. Comparison of radial shockwaves and conventional physiotherapy for treating plantar fasciitis. Clinics. 2009;64:97-3.