



To Check the Effect of Extracorporeal Shockwave Therapy in Plantar Fasciitis: A Review of Literature

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Abstract

Several previous studies have shown the effectiveness of Extracorporeal shockwave therapy in treating plantar fasciitis alone and in combination with other physiotherapy modalities such as ultrasound, dry needling, and soft tissue mobilization. The present review aims to study the available literature on extracorporeal shockwave therapy, including its doses and types, to describe its effectiveness in treating plantar fasciitis. The key terms used in this review are plantar fasciitis, extracorporeal shockwave therapy, heel pain and physiotherapy management.

Keywords: Shock wave, Planter Fasciitis, Mobilization, Heel Pain, Ankle Pain

Introduction

The plantar fascia is a connective tissue that runs from the calcaneus to the forefoot along the plantar surface of the foot. It is a common cause of adult heel pain, with a lifetime prevalence of up to 10% of the global population.^[1] The most common symptom is agonizing plantar heel pain, swelling and tenderness, which is worse with the first step in the morning or after a period of rest.^[2] The underlying cause of plantar fasciitis is degenerative rather than infectious, although the specific pathology of plantar fasciitis is still unknown. However, a combination of high mechanical stress and recurrent micro trauma is one of the primary causes of pathology.^[3] Plantar fasciitis is also known as the jogger heel, tennis heel, and police foot.^[4]

Extracorporeal shockwave therapy, a minimally invasive method, sends shockwaves through the skin to the affected areas. Initially used in clinical use in 1982 for treating urological disorders, it has gained popularity globally due to its minimal side effects and

noninvasive nature.^[5] Extracorporeal shockwaves are energy waves characterized by fast expansion and vaporization. Acoustic waves with an exceptionally high pressure and velocity are known as extracorporeal shock waves. Focused shock wave therapy and radial shock wave therapy are the two types of shock waves that are used in clinical settings; focused shock waves are produced inside the applicator and then focused by a lens before being transmitted into the tissue, whereas radial shock waves are typically produced by accelerating a projectile using compressed air.^[6] Extracorporeal shockwave therapy allows for quick recovery without the need for immobilization or limited weight bearing. The logic behind this method is to relieve pain by promoting soft tissue repair, reducing calcification, inhibiting pain receptors, or denervation.^[7]

Methodology

This review of the literature was done using primary research data from randomized clinical trials, subject

control studies, guidelines, field reports, and letters to the editor. Search engines used to search articles are PUBMED, GOOGLE SCHOLAR and RESEARCH GATE.

Review Of Literature

1. Kapsuta J.et.al (2022) conducted a study on “Extracorporeal shockwave therapy in helping Amateur runners” and he chooses 39 patients and divided them into two groups randomly who underwent shock wave therapy. The Visual Analogue Scale, the Modified Laitimen Pain Index Questionnaire, the AOFAS (ankle foot and ankle society), and a questionnaire about the subjective evaluation of therapeutic efficacy yielded the following findings -When extra corporeal shockwave therapy was used alone in group 1, 91.31% of respondents reported less pain, and when it was combined with other treatments in group 2, 100% reported less pain, the result shows that before and after therapy, there was no discernible change between the groups in the AOFAS index score and concluded that Extra corporeal shock wave therapy works better when combined with other modalities.^[8]
2. Orgur.et.al (2022) conducted a study on “Extracorporeal shockwave therapy’s effectiveness and safety in treating plantar fasciitis in axial spondylarthritis patients”. He performed randomized controlled experiment over 22 axial spondylarthritis patients with plantar fascia who reported heel pain and divided them into two groups at random: 1 group who had Extra corporeal shock wave therapy and second group who underwent sham-Extra corporeal shockwave therapy. Three separate treatments were given to both group at interval of 1 week till 8th week. The result shows that the Extra corporeal shockwave therapy group showed statistically significant improvements in activity limitation, perceived pressure algometry values, and pain level and he concluded that Extra Corporeal shockwave therapy seems to be a secure and well-tolerated physical therapy technique for treating individuals with axial spondylarthritis who have chronic, intractable heel pain.^[9]
3. Volkan Sah.et.al (2022) conducted a study on “Examining the differences between focal and radial types of extracorporeal shockwave therapy in the plantar calcaneal spur” he chooses 99 patients with plantar calcaneal spurs and randomly divided them into three groups according to the ESWT types: focused, radial, and sham. ESWT was used in three sessions, separated by 2-4 days. Both the focused and radial Extracorporeal shockwave therapy groups substantially outperformed the control group across all outcome measures. On the basis of the changes in the FFI scores, the result shows radial group outperformed the focused group, and he concluded that plantar calcaneal spur treatment with targeted and radial Extracorporeal shockwave therapy is successful. Radial group outperforms targeted group in the plantar heel spur in terms of the intensity and persistence.^[10]
4. Pelin Pisirici.et.al (2022) conducted a study on “Graston instrumented soft tissue mobilization versus Extracorporeal shockwave therapy for treating persistent plantar heel discomfort” he divided 69 patients randomly into three groups: group1-Extracorporeal shockwave therapy plus stretching exercises, group 2-graston plus stretching exercises group, and group3-stretching exercises only. The results from the “VAS, foot function index, 12-item short form healthy survey, and Tampa scale” from pre, post, and follow-up assessments suggest that the group 1 : extracorporeal shockwave therapy plus stretching exercises and group 2 : Graston plus stretching exercises had comparable benefits and concluded that it is most efficient treatment method for managing chronic heel pain.^[11]
5. Eren Timurtas et.al (2022) conducted study while “treating plantar fasciitis patients he compared low level laser therapy Vs Extracorporeal shockwave therapy” he performed randomized control trial in 47 patients and divided them into two groups: group 1-Extracorporeal shockwave therapy , which included 27 patients, and group 2 - Low level laser therapy, which included 20 patients, the result showed that group 2 - Low level laser therapy exhibited a substantial decrease in pain, disability, and activity limitation and discovered that Low level laser therapy was More

- efficient than Extracorporeal shockwave therapy in the short term.^[12]
6. Lucrezia Tognolo.et.al (2022) conducted study on “For patients with plantar fasciitis, myofascial sites may be treated with focused Extracorporeal shockwave therapy” he randomly divided 26 patients in two groups. Group 1 - experimental treatment group, treated by focused extra corporeal therapy on myofascial points and group 2 - control group, treated by Extracorporeal shockwave therapy traditional approach. Each patient underwent three sessions and was followed up after 1 and 4 months. Result showed increase in Improvement in the 17 Italian foot functional index and the foot and ankle outcome score and it was concluded that improvements have been made to the score values, and it is a practical choice.^[13]
 7. Serdar Kesikburun.et.al (2021) conducted study on “In the treatment of chronic plantar fasciitis ,an evaluation of ultrasound guided Prolotherapy Vs Extracorporeal shockwave therapy.” He chooses 29 patients and randomly divided into two groups, Group1 include 15 patients, they were given Extracorporeal shockwave therapy and Group 2 include 14 patients, they received dextrose prolotherapy. Foot function index, the overall VAS, the morning VAS, other scale score, at the end of 6 and 12th week assessments were made. The results showed that considerable improvement in both therapies, and it was concluded that none was superior to the other and had comparable efficacy in patients with chronic plantar fasciitis.^[14]
 8. Namon Goel.et.al (2021) conducted study on “A comparative study between intralesional rich plasma injection and extracorporeal shockwave therapy” he randomly divided 60 patients in two groups of 30 each. Plasma rich injected group received 3 intralesional injection and Extracorporeal shockwave therapy group received 3 sessions of ESWT. Only the VAS scale for both groups showed statistically significant results at the 6-month mark, while the results from American Orthopedic Foot and Ankle Society, the Ankle Hindfoot score, the Roles and Maudsley index, and the Heel Tenderness index did not show any statistically significant differences between the two groups and he concluded that, both treatment modalities resulted in significant clinical improvement without any negative side effects.^[15]
 9. Ashraf Fansa.et.al (2020) conducted a study on “Efficiency of unfocused medium intensity extracorporeal shockwave for plantar fasciitis” There were 108 patients who received treatment weekly for 21. The pre-ESWT pain visual score, function of daily living, function of sports and recreational activities and quality of life domains were pleased with the results and he concluded that it helps in considerable pain relief and functional improvement.^[16]
 10. Mahsa Ashegher.et.al (2020) conducted study on “Radial extracorporeal shock wave therapy vs dextrose prolotherapy for the treatment of persistent plantar fasciitis.” He performed randomized controlled trial over 59 individuals who had chronic heel pain and divided them into 2 groups. Group 1 received 3 sessions of radial extracorporeal shockwave therapy and Group 2 with 2 sessions of ultrasound-guided intrafascial 2CC dextrose injection. The result showed significant improvements in pain and function were noted on the VAS and Foot and Ankle Mobility Measure and he concluded that dextrose prolotherapy is as effective as radial ESWT in reducing pain, daily functional limitations, and plantar fascia thickness in plantar fasciitis patients.^[17]
 11. Eda Cinar.et.al (2020) conducted a study on “Utilizing extracorporeal shockwave treatment to treat plantar fasciitis” A total of 44 participants were randomly divided into two groups, one group received only standard care and the other group received at-home exercises and orthopedic assistance. Results from the 12 minute walk test and the American Orthopedic Foot and Ankle Society score revealed a considerable improvement in standard care group and he concluded that for patients with plantar fasciitis, extra corporeal shock wave therapy did not provide an additional advantage above normal therapy in terms of improving foot function and walking ability.[18]

12. Faith Bagcier.et.al (2020) conducted a study on “The Effects of Extracorporeal Shock Wave Therapy and Dry Needling in Patients with Plantar Fasciitis on Pain and Functionality” He chooses 40 patients and randomly divided them into two groups, one group with Extracorporeal shockwave therapy plus Dry needling and another group with Extracorporeal shockwave therapy alone and the results shows that the VAS scores, maximum painless standing time, maximum walking distance, and FFIs pain, disability, and limitation scales were consistently higher in the ESWT DN group. And he concluded that ESWT and DN combination therapy for PF was superior in terms of pain scores.^[19]
13. Edoardo Pisani.et.al (2020) conducted a study on “Focal versus radial extracorporeal shock wave therapy's effectiveness and tolerance in individuals with plantar fascia enthesopathy” and he randomly divide focal extracorporeal shockwave therapy (f-ESWT group) or radial extracorporeal shockwave therapy group (r-ESWT group) for one session. Utilizing the intensity and interference indices from the brief pain inventory (BPI), pain evaluation was done at baseline, before each session, and one month after the previous session. The result showed both groups reported a substantial reduction in brief pain inventory, however only the f-ESWT group's plantar fascia thickness showed a significant reduction. In the Radial-ESWT group, the patient's tolerance was noticeably better. He conducted that ESWT is helpful for lowering pain and impairment in individuals with plantar fasciitis, however Radial-ESWT appears to be superior.^[20]
14. Omei Gezginaston.et.al (2020) conducted study on “Effectiveness of Extracorporeal Shock Wave Therapy in Patients with Plantar Fasciitis: A Comparison of Density and Number of Sessions”. and he randomly divide 94 patients in 3 group, high level ESWT, low level ESWT, medium level ESWT. The Visual Analogue Scale (VAS), Short Form-36, Foot Function Index (FFI), Functional Assessment of Chronic Illness Therapy (FACIT)-Fatigue Scale, and Six-Minute Walking Test (6MWT)” scores were compared among the groups. According to the results of the study, H-ESWT is superior to LESWT when used for a greater number of sessions to treat PF patients' and concluded that pain, quality of life, physical function, weariness, and impairment is much more improved.^[21]
15. EUR J Transl Myol.et.al (2020) conducted a study on “Extracorporeal shockwave therapy as part of a comprehensive strategy for treating plantar fasciitis” and he performed randomized controlled trial in A 63-year-old man with plantar fasciitis over the course of three sessions, and the clinical result was assessed using the “Foot and Ankle result Scale and the Foot Functional Index questionnaires”. The active trigger or myofascial points of the leg, thigh and pelvis were the focus of the therapy in order to regain the myofascial system's natural balance over the entire limb. The result showed improvement after the second session, and this was confirmed in the last session of treatment span of 30 days and he concluded that ESWT strategy may produce results that are comparable to or superior to those of the typical use.^[22]
16. Sibel Caglar Okur.et.al (2019) conducted a study on “Extracorporeal shock wave therapy and specialized foot orthotics are contrasted in the treatment of plantar fasciitis.” He chooses 83 patients and randomly divided them into two groups. Group 1 include 40 patients who were treated with extracorporeal shockwave therapy and group2 which include 43 patients treated with custom foot orthotics, Pain was rated using a visual analogue scale (VAS) in the morning, evening, at rest, and when moving. Foot Health Status Questionnaire (FHSQ) and Foot Function Index (FFI) were employed to assess the health and function of the feet, respectively. The result showed that evaluation parameters (morning and evening pain) significantly improved in both groups at 4, 12, and 24 weeks compared to their baseline values, and he concluded that ESWT and CFO treatments are both interchangeable. Both approaches were equally effective in curing plantar fasciitis.^[23]
17. Ta Wei Lai.et.al (2018) conducted a study on “Ultrasonography and clinical outcome comparison of Extracorporeal shockwave

- therapy” and he performed a randomized controlled trial over 97 patients and divided them into two groups. Group 1 include 50 patients received corticosteroid injection and Group 2 include 47 patients received extracorporeal shockwave therapy. Under ultrasonography, the result showed a greater increase in plantar fascia thickness in the group 2, and the VAS of plantar fasciitis patients receiving extracorporeal shockwave therapy group was lower than that of patients receiving corticosteroid injection, and he concluded that extracorporeal shockwave therapy group is more effective than corticosteroid injection in treating chronic plantar fasciitis.^[24]
18. Mary Kamal Nassif Takla.et.al (2018) conducted study on “Clinical efficacy of extracorporeal shock wave therapy in combination with multi-wavelength photo bio modulation therapy for the treatment of plantar fasciitis.” He divided 120 patients with chronic plantar fasciitis into 4 groups. Group 1 with either extracorporeal shockwave with photo biomodulation therapy, group 2 with extracorporeal shockwave therapy [1 time a week], group 3 photo biomodulation therapy [3 times in a week] and group 4 sham photo biomodulation therapy [3 times in a week]. The result shows In all treatment groups, the post-intervention and follow-up PPT, VAS, and FFI-d values showed statistically significant improvements at end of 12 weeks final treatment and concluded that extracorporeal shockwave therapy was more beneficial in comparison to photo biomodulation therapy in terms of reducing pain and increasing function.^[25]
19. Mualla Biceret.al (2018) conducted study on “Magnetic resonance imaging results are used to evaluate the effectiveness of extracorporeal shockwave therapy for plantar fasciitis”. There were 30 plantar fasciitis sufferers who had been untreated for six months. A total of three sessions of extracorporeal shockwave treatment were performed. The Foot and Ankle Outcome Score (FAOS), a 6-point assessment scale, the visual analogue scale, and MRI results were all used to evaluate each patient before and three months after ESWT. The results After receiving therapy, it was shown that some MRI abnormalities, such as thickening of the plantar fascia and edema in the soft tissues and bone marrow, were significantly decreased and concluded that it is safe and effective treatment.^[26]
20. M.handa.et.al (2017) conducted study on “The impact of extracorporeal shock wave therapy on the activity level and localization of pain in middle-aged individuals with plantar fasciitis” he chooses 92 patients and randomly divided them into in simply daily life activities (group D) or in recreational sports (group R). Patients were divided into two groups according to whether they were experiencing discomfort in the plantar fascia enthesis (group E) or the complete plantar fascia (group W). The visual analogue scale (VAS) was used to assess overall discomfort and pain during exercise before and after ESWT. The result showed that, group E showed considerably more both the “pain and tenderness VAS” readings have improved and he came to the conclusion that ESWT was effective in treating plantar fasciitis in go between people, and it was successful in treating long suffering people who participated in everyday activities as well as recreational sports. Patients experiencing pain in the plantar fascia enthesis responded better to extracorporeal shockwave than those with discomfort throughout the whole plantar fascia.^[27]

Discussion

According to the above study findings that we looked at in the current systemic review, Extracorporeal shockwave therapy seems to be a factor that can help patients with plantar fasciitis. Our results showed that when Extracorporeal shockwave therapy used with other modalities, it shows more impact in treating plantar fasciitis.

Kapusta.et.al yielded the following findings when extra corporeal shockwave therapy was used alone in group 1, 91.31% of respondents reported less pain, and when it was combined with other treatments in group 2,100% reported less pain, the result shows that before and after therapy, there was no discernible change between the groups in the AOFAS index scores and concluded that Extracorporeal shockwave

therapy works better when combined with other modalities.^[8]

Faith Bagcier.et.al conducted that Extracorporeal shockwave therapy and Dry needling combination therapy works better together in treatment of plantar fasciitis.^[19]

Mualla Biceret.et.al conducted a three session of Extracorporeal shockwave therapy on plantar fasciitis patients in span of three months and the result showed some MRI abnormalities, such as expansion of the plantar fascia and edema in the soft tissues and bone marrow, were significantly decreased and concluded that it is safe and effective treatment.^[26]

Mary Kamal Nassif Takla.et.al result showed in all the treatment groups after the post arbitration and checked out that “PPT, VAS and FFI-d values showed statistically significant improvement at end of 12 weeks final treatment and concluded that Extracorporeal shockwave therapy was more beneficial in comparison to photo biomodulation therapy.^[25]

Conclusion

After reviewing the above context, it is concluded that Extracorporeal shockwave therapy is the best management for treating plantar fasciitis with minimal complications. In addition to this we can also use some other modalities such as Photo biomodulation, Ultrasound, Dry needling, Laser therapy, Soft tissue mobilization, these combination will work as the best in order to treat short as well as long term plantar fasciitis.

Extracorporeal shockwave therapy in addition to conservative management and physiotherapy management is found to be more effective and could help in treating plantar fasciitis ESWT is used to treat musculoskeletal disorder or symptoms related to it. It can help the patients by strategically using ESWT over the affected area. It is a simple way to speed up the recovery process. There are two types of Extracorporeal shockwave therapy that are used in clinical settings - Focused shockwave and radial shockwave. They provide quick recuperation without the need for immobilization or limited weight bearing.

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