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Effectiveness of extracorporeal shockwave therapy in the treatment of chronic plantar fasciitis: a literature review

Eficacia de las ondas de choque en el tratamiento de la fascitis plantar crónica: revisión bibliográfica

Manuel Alcalá-Cruz[1], Marta Moreno-Fresco[2] and Priscila Távara-Vidalón[1,2]

[1]Departamento de Podología. Facultad de Enfermería, Fisioterapia y Podología. Universidad de Sevilla. Seville. Spain [2]Clínica privada

Keywords:

Extracorporeal shock wave therapy, chronic plantar fasciitis, foot, heel pain.

Abstract

Introduction: Extracorporeal shock wave therapy has been widely used in recent years to treat chronic plantar fasciitis. It consists of high-pressure, high-speed acoustic waves that, when applied to chronic inflammatory or degenerative processes, induce hyperemia, neovascularization, and tendon tissue regeneration. The main objective of this literature review was to evaluate its effectiveness in the treatment of this condition.

Materials and methods: A search was conducted in various scientific databases during January and April 2024. After applying inclusion and exclusion criteria, a total of 49 articles were selected and analyzed. Of these, 15 met the search criteria and were included in the discussion.

Results: Extracorporealshock wave therapy showed moderate-to-high evidence in reducing pain in the short, medium, and long term in patients with chronic plantar fasciitis. Additionally, foot function improved according to various scales that assess the relationship between pain and the patient's functionality/mobility.

Discussion: Extracorporeal shock wave therapy is an effective, valid, and safe method for treating chronic plantar fasciitis. However, discrepancies exist regarding its application protocol. Additionally, there is a lack of studies comparing the two modalities (radial and focused), making it impossible to determine which is more effective.

Palabras clave:

Terapia con ondas de choque, fascitis plantar crónica, pie, dolor de talón.

Resumen

Introducción: Las ondas de choque son un tipo de terapia muy utilizada en los últimos años para tratar la fascitis plantar crónica. Consisten en ondas acústicas de alta presión y gran velocidad que, aplicadas en procesos inflamatorios o degenerativos crónicos, generan hiperemia, neovascularización y regeneración del tejido tendinoso. El objetivo principal de esta revisión bibliográfica fue comprobar su efectividad en el tratamiento de esta patología.

Material y métodos: Se ha realizado una búsqueda en diversas bases de datos científicas durante los meses de enero y abril de 2024. Tras aplicar criterios de inclusión y exclusión, se seleccionaron y analizaron un total de 49 artículos. De estos, 15 cumplieron con los criterios de búsqueda y se incluyeron en la discusión.

Resultados: La terapia con ondas de choque mostró evidencia moderada-alta en la reducción del dolor a corto, medio y largo plazo en pacientes con fascitis plantar crónica. Además, se mejoró la función del pie según varias escalas las cuales relacionan el dolor con la funcionalidad/movilidad del paciente.

Discusión: Las ondas de choque son un método eficaz, válido y seguro para el tratamiento de la fascitis plantar crónica. Sin embargo, existen discrepancias en cuanto al protocolo de aplicación de la misma. También, encontramos falta de estudios que compararon las 2 modalidades (radiales y focales), por lo que no se pudo determinar cuál es más eficaz.

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Corresponding author:
Priscila Távara-Vidalón
priscilatavara16@gmail.com

Introduction

Focused shockwave therapies (FSW) and radial shockwave therapies (RSW) have recently been introduced as treatment options for chronic plantar fasciitis. Extracorporeal shockwave therapy (ESWT) offers advantages such as its non-invasive nature, rapid recovery time, and convenience for patients' daily lives[1].

As health care professionals, we must keep our knowledge updated to provide our patients with the best healthcare. Therefore, with this work, we aim to obtain the necessary evidence and deepen our knowledge about the efficacy of shockwave therapy in patients with chronic plantar fasciitis, due to the frequency with which we encounter patients in consultation presenting with heel pain or heel pain when walking. According to some authors, it is estimated that 1 in 10 people will suffer from chronic plantar fasciitis at least once in their lives[2].

The primary endpoint of this literature review was to verify the effectiveness of shockwaves in the treatment of chronic plantar fasciitis. Our secondary endpoints were to understand the types of waves used, the duration and intensity of the sessions; to establish application guidelines; and to identify the side effects after its use.

Materials and methods

For this bibliographic review, 15 articles collected between January and April 2024 were evaluated across PubMed, Scopus, Dialnet, and *Universidad de Sevilla* Health Library databases.

The keywords used were: "high energy shock waves" "ESWT" "plantar fasciitis" and "heel pain". All of them were combined using the Boolean operators "AND" and "OR."

The inclusion criteria were articles published between 2014-2024, articles in English and Spanish, randomized clinical trials, meta-analyses, and clinical trials, articles containing relevant information regarding ESWT for chronic plantar fasciitis, articles containing information on the dose, method, and application of ESWT. The exclusion criteria were: articles published before 2014, articles dealing with ESWT applied to other pathologies, articles that, even meeting the inclusion criteria, were not relevant.

Articles that gathered information on the physical principles of ESWT, biological effects, and their applications within health science were used. In the next step, articles related to fasciitis were used, and finally, different searches were carried out using the previously described criteria to determine the efficacy of ESWT application as a treatment for chronic plantar fasciitis.

Results

According to the selection process carried out, the following results were obtained: In PubMed, the first search with the indicated strategies yielded a total of 1018 results; 111 were selected, and 9 were used. In Scopus, the same procedure was carried out using the same strategies, yielding a total of 2693 results; 151 were selected, and 6 were used.

For the presentation of the results in the discussion section, Table I has been prepared, highlighting the objectives and conclusions developed by the studies on the efficacy of ESWT in the treatment of CPF. The results of the articles are presented chronologically in descending order of publication date.

Discussion

This section will discuss the results based on the objectives set.

Numerous studies, with different degrees of recommendation, support the effectiveness of ESWT in the treatment of CPF. Regarding the efficacy of the therapy in reducing pain, according to Charles et al.[3], their meta-analysis of 13 studies compared ESWT treatment with placebo, concluding with moderate-to-high evidence that ESWT has a significant effect on reducing short-, medium-, and long-term pain in CPF patients. Furthermore, foot function also improved, which was assessed using different types of scales. Most studies used the American Orthopedic Foot and Ankle Society (AOFAS), Roles and Maudsley (RMS), and Foot Function Index (FFI) scales, which relate pain to patient functionality/mobility[3].

Some authors have compared ESWT treatment with the application of other treatments to evaluate its efficacy profile. We will mention them grouped by the type of treatment, whether physical therapies (local vibration (LV), myofascial points, ultrasound (US), taping (KT), and stretching), invasive treatments (corticosteroid infiltration (CSI) and dry needling), and treatment with plantar orthoses (CFO).

The most recent study comparing the effectiveness of ESWT treatment as a sole therapy with the association of ESWT and LV was by Ony Yim in 2023[4]. According to these authors, ESWT is undoubtedly beneficial but is also more costly and associated with some side effects. LV treatment can be considered a complement to ESWT, as it can increase the effect of ESWT due to its potential to decrease pain and increase blood flow. Combined ESWT and LV treatment showed a significant difference in reducing plantar fascia thickness and pain[4]. Another recent study comparing the efficacy of ESWT applied to the most painful area of the heel with application to myofascial points is by Tognolo et al. conducted in 2022[5]. Their study determined that ESWT is an effective treatment option for CPF using the standard application at the insertion of the plantar fascia into the medial calcaneus.

Continuing with physical therapies, the study by Li et al. [6] compared the efficacy profile of ESWT with US. The meta-analysis results obtained with ultrasound showed no improvements in US application compared to the control group in the short, medium, and long term. The meta-analysis concluded that RSW had the highest probability of providing the best outcome between 2 and 4 months in patients who had symptoms for more than 6 months and in whom other conservative therapies had been unsuccessful[10]. However, Akinoğlu et al.[7] conducted a randomized clinical trial in which they established three groups: one with RSW, another with US, and the last was a control group. Their results showed that pain, disability, and FFI activity limitations were reduced in all three groups after treatment. All 3 groups, especially the RSW and US groups, 3 had a significant improvement in all parameters. This improvement occurred more in the US group. The authors believe this is due to its tissue effects, generating a more significant pain reduction and a decrease in activity limitations and disability due to these effects[7].

Table I. Results obtained from the literature review on the efficacy of shockwave therapy in the treatment of plantar fasciitis.

Title and author	Objectives	Conclusions
The effectiveness of shockwave therapy on patellar tendinopathy, Achilles tendinopathy, and plantar fasciitis: a systematic review and meta-analysis. Charles et al. (2023)	To provide a level of recommendation, assessment, development, and evaluation of the evidence and efficacy of ESWT for PF	ESWT had a large effect with level I evidence in improving function and reducing pain in the short, medium, and long term for PF
Effects of local vibration combined with extracorporeal shock wave therapy in plantar fasciitis: a randomized controlled trial. Ony Yim (2023)	To compare the effects of local vibration (LV) + ESWT vs ESWT alone for PF	LV + ESWT is an effective treatment for PF
Myofascial points treatment with focused extracorporeal shock wave therapy (f-ESWT) for plantar fasciitis: an open label randomized clinical trial. Tognolo et al. (2022)	To evaluate the effectiveness of FSW on myofascial points in a sample of subjects with PF	ESWT is an effective treatment option for PF, both at the standard application site (medial calcaneal insertion) and at myofascial points
Comparison of extracorporeal shock wave therapy with custom foot orthotics in plantar fasciitis treatment; A prospective randomized one-year follow-up study. Çaglar et al. (2019)	To investigate the effectiveness of ESWT + custom foot orthotics (CFO)	Both ESWT and CFO treatments can be used interchangeably. Neither method was superior for treating PF
Efficacy of Different Energy Levels Used in Focused and Radial Extracorporeal Shockwave Therapy in the Treatment of Plantar Fasciitis: A Meta-Analysis of Randomized Placebo-Controlled Trials. Wang et al. (2019)	To evaluate the efficacy of different energy levels used in ESWT for the treatment of PF	Medium-energy ESWT, regardless of the type of shockwave generator, was more effective than control at 12 months
Comparative effectiveness of extracorporeal shock wave, ultrasound, low-level laser therapy, noninvasive interactive neurostimulation, and pulsed radiofrequency treatment for treating plantar fasciitis: A systematic review and network meta-analysis. Xian Li et al. (2018)	To comprehensively compare the efficacy of various therapies for PF through a network meta-analysis	RSW provided relatively more effective pain relief and is a promising candidate for clinical use. Ultrasound and FSW therapies may also be considered treatment options
A comparison of the efficacy of dry-needling and extracorporeal shockwave therapy for plantar fasciitis: a randomized clinical trial. Rahbar et al. (2018)	To compare pain and function improvement in PF patients treated with ESWT and dry needling	Both ESWT and dry needling were effective in treating PF
Comparison of the Acute Effect of Radial Shock Wave Therapy in the Treatment of Plantar Fasciitis: A Randomized Controlled Study. Akinoglu et al. (2017)	To compare the efficacy of RSW therapy and ultrasound therapy in the treatment of PF	ultrasound (US) + RSW treatments are effective methods for reducing PF symptoms
Long-term results of radial extracorporeal shock wave treatment for chronic plantar fasciopathy: A prospective, randomized, placebo-controlled trial with two years follow-up. Ibrahim et al. (2017)	To determine whether RSW is effective and safe for PF treatment with 2-year long-term follow-up	The use of RSW in PF patients is effective and safe, leading to significant long-term pain reduction with no adverse effects
Extracorporeal shock wave therapy is effective in treating chronic plantar fasciitis: A meta-analysis of RCTs. Sun et al. (2017)	To compare the effectiveness of general ESWT, FSW, and RSW versus placebo in evaluating PF treatment	This meta-analysis suggests FSW therapy can relieve PF pain and is an ideal alternative treatment. Firm conclusions cannot be drawn about the overall efficacy of ESWT and RSW
Complications of extracorporeal shockwave therapy in plantar fasciitis: Systematic review. Roerdink et al. (2017)	To evaluate complications and side effects of ESWT to determine if it is a safe treatment for PF	ESWT is likely a safe treatment for PF. No complications were expected after one year of follow-up
Extracorporeal Shockwave Therapy Versus Kinesiology Taping in the Management of Plantar Fasciitis: A Randomized Clinical Trial. Ordahan et al. (2017)	To compare the efficacy of ESWT and kinesiology taping (KT) in treating PF	Both ESWT and KT improved pain, function, and quality of life in people with PF
Clinically relevant effectiveness of focused extracorporeal shock wave therapy in the treatment of chronic plantar fasciitis: a randomized, controlled multicenter study. Gollwitzer et al. (2015)	To test whether FSW therapy is effective in relieving chronic heel pain diagnosed as PF	Clinically relevant effect of FSW without local anesthesia in treating PF, with success rates between 50 % and 65 %
Radial shock wave treatment alone is less efficient than radial shock wave treatment combined with tissue-specific plantar fascia-stretching in patients with chronic plantar heel pain. Rompe et al. (2015)	To compare the clinical outcome of PF after ESWT as sole therapy and after ESWT in combination with specific PF stretching	A stretching exercise programme for PF with repetitive low-energy RSW therapy is more efficient than repetitive low-energy RSW therapy alone for the treatment of PF

The efficacy of ESWT with neuromuscular taping has also been compared. Ordahan et al.[8] conducted a randomized clinical trial with 83 subjects diagnosed with CPF. They divided the subjects into two groups, one treated with ESWT and the other with KT. This study concluded that both improved pain levels, function, and quality of life in people with CPF. Neither method was statistically superior[8].

Other authors who compared the effectiveness of ESWT with specific plantar fascia stretching exercises to reduce pain in the medium term were Rompe et al. in 2015[9]. Clinically, they demonstrated that low-energy RSW therapy, when repeatedly applied, targets the most sensitive point on the medial calcaneal tuberosity and this leads to a significant and persistent improvement of CPF symptoms. However, when combined with an eight-week plantar fascia-specific stretching program, significantly faster pain relief was achieved within two months of treatment initiation vs RSW therapy alone[9].

On the other hand, within invasive therapies, the efficacy of ESWT therapy was compared with dry needling. Rahbar et al.[10] conducted this study to determine whether dry needling was more effective than ESWT or vice versa. There were no significant differences between the groups; however, after eight weeks, pain reduction and FFI score were significantly greater in the dry needling group[10].

Regarding the evaluation of ESWT efficacy vs corticosteroid infiltration (CSI), Li et al.[11] conducted a meta-analysis that analyzed 9 randomized clinical trials. The results showed that pain relief and success rates were related to energy intensity levels, with high-intensity ESWT having the highest probability of being the best treatment at 3 months, followed by CSI and low-intensity ESWT. However, due to the lack of long-term follow-up studies, subgroup analysis based on intensity levels could not be performed, so conclusions about long-term efficacy are still unknown[11].

Finally, regarding the comparison of ESWT with plantar orthoses, Çaglar et al.[12] conducted a study in which patients were categorized into 2 groups. The results determined that ESWT and CFO were effective modalities for reducing pain, improving foot functions, and maintaining foot health. Furthermore, when comparing the two methods, there was no superiority between them in terms of short- and medium-term effects. However, CFO was more effective than ESWT in reducing pain, improving functions, and maintaining foot health in the long term.

Related to energy intensity levels, Li et al.[6] divided ESWT treatment intensity into 3 levels: low (energy flux density ≤ 0.08 mJ/mm^2), medium (energy flux density = 0.08-0.28 mJ/mm^2), and high intensity (energy flux density ≥ 0.28 mJ/mm^2). On the other hand, Wang et al. (2019)[2], through a meta-analysis, analyzed therapy applied at different intensities: low (energy flux density < 0.10 mJ/mm^2), medium (energy flux density: 0.10-0.20 mJ/mm^2), and high intensity (energy flux density ≥ 0.2 mJ/mm^2). Analyzing the criteria used by these studies, we conclude that there is no clear classification that definitively differentiates the different intensity levels used, as the figures used in them are different.

Regarding the effectiveness of different intensity levels, Wang et al.[2] obtained results showing that the high-energy ESWT group had a better success rate at the 3-month follow-up. Treatment success rate and the VAS score, which is used to measure the patient's pain level, were the two outcome measures adopted to evaluate the efficacy of low-, medium-, and high-intensity ESWT. To consider a treatment successful, the pain reduction range was 50-60 % from the beginning of the treatment. A decrease of ≥ 50 % in the VAS score can be defined as successful pain management. Another result they obtained was that the medium-energy ESWT group had significantly better success rates than the control group at all follow-up visits (3, 6, and 12 months). These results indicate that medium-energy ESWT with a flux density between 0.10-0.20 mJ/mm^2 was an effective treatment strategy for reducing pain in CPF treatment.

However, Li et al.[6] showed that low-intensity therapy (energy flux density ≤0.08 mJ/mm^2) had the most significant pooled reduction in the VAS scale during the 6- to 12-month period. In a different study, Li et al. (2018)[11] demonstrated that high-intensity ESWT therapy (> 0,2 mJ/mm^2) had reliable success rates and ultimately yielded favorable results, generating pain relief superior to 2-3 months of treatment, establishing that high-intensity ESWT had the highest probability of being the best treatment within 3 months. Again, we find a lack of consensus on which wave density is most effective.

We also find disagreement in the choice of wave type, where some authors advocate for the use of FSW and others for RSW. Wang et al.[2] compared FSW therapy with RSW under medium energy conditions (0.10-0.20 mJ/mm^2). The RSW group had a better success rate than the control group at 3, 6, and 12 months of follow-up, as did the FSW group. Regarding the VAS scale, both RSW and FSW showed greater improvement in pain scores than the control group at the 6- and 12-month follow-up. They compared the 2 types of ESWT under the same condition, including similar energy levels (medium intensity) and similar follow-up periods. The results showed that the efficacy of the RSW and FSW groups was better than that of the control group, although the efficacy of FSW appears to be better than RSW according to the total values of the meta-analysis.

A few years earlier, Gollwitzer et al.[13] tried to prove whether FSW was effective, comparing it with a control group, to relieve CPF. The FSW group received a total of 3 sessions at weekly intervals consisting of 2000 impulses with an energy density of 0.25 mJ/mm^2 without local anesthesia, where the applicator was directed to the most sensitive point. The results were based on the overall reduction in heel pain, measured by the percentage change in the VAS scale score 12 weeks after the last intervention vs the baseline score, and functional improvement measured by the RMS score. This scale establishes a relationship between pain and the patient's range of motion. The superiority of FSW compared to placebo in the treatment of CPF was confirmed for both primary outcome measures. In conclusion, FSW therapy applied in weekly interventions (a total of 3 × 2000 impulses, 0.25 mJ/mm^2) without local anesthesia showed clinically relevant efficacy in the treatment of CPF.

On the other hand, Ibrahim et al.[14] conducted a study aiming to determine whether RSW was effective and safe for CPF treatment, comparing it with placebo and with a long-term 2-year follow-up. Each patient received 2 sessions one week apart, with 2,000 impulses per session, and all RSW or placebo treatment sessions lasted approximately 10 minutes. Patients were asked to evaluate pain and quality of life before the study began, as well as at 1, 3, 6 months, 1, and 2 years after RSW or placebo treatment, respectively. The clinical outcome was evaluated face-to-face by observers blinded to treatment assignment. During each visit, a questionnaire addressing the VAS score and the RMS score was completed (RMS score 1 represented "excellent" quality of life, while RMS score 4 meant "poor" quality of life). The study results suggest that the use of RSW in CPF

patients leads to a significant long-term reduction in pain without adverse effects[14].

Similarly, Li et al.[6] concluded that RSW had a higher probability of providing the best outcome between 2 and 4 months vs other treatment alternatives, including FSW. They strongly recommend RSW for adults with CPF who have had symptoms for more than 6 months and in whom conservative therapies have been unsuccessful before surgical treatments are considered.

Finally, Sun et al.[1] conducted a meta-analysis to compare the efficacy of general ESWT, FSW, and RSW with placebo and evaluate their effectiveness in CPF. Therapeutic success was defined as a decrease in the VAS scale score from baseline greater than 50 % or 60 %, where FSW therapy had higher improvement or success rates than placebo, while RSW therapy had higher results than placebo, but significant heterogeneity was observed, so firm conclusions could not be established on which type of wave is most effective for CPF treatment. However, ESWT was shown to be effective and safe in CPF treatment in a comprehensive comparison of success or improvement rates.

Regarding the therapy application protocol, there are different author opinions on some points. As for the number of pulses applied per session, most of the analyzed articles apply a total of 2000 pulses[4,5,10,12-14]. In all cases, pulses have been applied directly, except for Gollwitzer et al.[13] who applied 500 introductory pulses, progressively increasing energy levels. On the other hand, Ordahan et al.[8] applied 2500 pulses per treatment session, being the only study analyzed that applied this amount.

The application site for therapy is usually the point of greatest pain or sensitivity shown by the patient, which usually coincides with the insertion of the fascia into the calcaneus[4,8,9]. Akinoglu et al.[7] first applied 500 pulses to the entire heel area and the remaining 1500 to the point of maximum pain. Çaglar et al.[12] determined the 5 most painful points the patient had in the heel and applied 400 pulses to each of them. The number of sessions varies according to the authors; the most common found in the review of the various articles is the application of a total of 3 sessions, once a week[7,9,10,12,13]. Others establish the treatment guideline as 2[14] or 5 weeks, maintaining 1 session per week[12]. Only one article carries out 2 sessions per week for 5 weeks[4].

The only reference regarding the duration of sessions we found in the various reviewed articles was in the study by Ibrahim et al.[14], where each treatment session lasted for about 10 minutes.

Regarding complications or side effects related to ESWT application, we only found one study that specifically investigated this topic. Roerdink et al.[15] conducted a meta-analysis aimed at understanding the complications of ESWT for CPF. According to studies that reported the incidence of events, 403 out of 1946 patients (20.7 %) had side effects from ESWT application. Pain during treatment was reported 225 times, transient reddened skin after treatment occurred 249 times. Other effects such as dysesthesia, swelling, ecchymosis, severe headache, bruising, stinging sensation, and post-treatment pain were also mentioned in some studies. A significant and commonly reported side effect is pain during treatment. Pain appears to be influenced by the type of ESWT: low doses result in a reduced risk of pain during treatment compared to high doses. After analyzing all the studies in this meta-analysis, they concluded that complications are very unlikely to occur during the first year of follow-up after the last ESWT treatment. Long-term complications are not described in the current literature[15].

In conclusion, after the review, it can be affirmed that ESWT is an effective and valid method for the treatment of chronic plantar fasciitis, regardless of the type of wave and intensity level applied. The contrasted authors use different application protocols, with the most commonly applied therapy being 2000 pulses once a week for 3 weeks in the area of maximum pain and/or sensitivity in the patient's heel. ESWT is a safe and low-risk therapy for the treatment of chronic plantar fasciitis.

Authors' contributions

Conception and design: MAC, PTV.
Data collection: MAC, PTV.
Analysis and interpretation: MAC, PTV.
Creation, writing, and initial draft preparation: MAC, MMF, PTV. Final review: MAC, MMF, PTV.

Conflicts of interest

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References

1. Sun J, Gao F, Wang Y, Sun W, Jiang B, Li Z. Extracorporeal shock wave therapy is effective in treating chronic plantar fasciitis: A meta-analysis of RCTs. Medicine (Baltimore). 2017;96(15): e6621. DOI: 10.1097/MD.0000000000006621.
2. Wang YC, Chen SJ, Huang PJ, Huang HT, Cheng YM, Shih CL. Efficacy of different energy levels used in focused and radial extracorporeal shockwave therapy in the treatment of plantar fasciitis: A meta-analysis of randomized placebo-controlled trials. J Clin Med. 2019;8(9):1497. DOI: 10.3390/jcm8091497.
3. Charles R, Fang L, Zhu R, Wang J. The effectiveness of shockwave therapy on patellar tendinopathy, Achilles tendinopathy, and plantar fasciitis: A systematic review and meta-analysis. Front Immunol. 2023;14:1193835. DOI: 10.3389/fimmu.2023.1193835.
4. On H, Yim J. Effects of local vibration combined with extracorporeal shock wave therapy in plantar fasciitis: A randomized controlled trial. J Rehabil Med. 2023;55: jrm12405. DOI: 10.2340/jrm.v55.12405.
5. Tognolo L, Giordani F, Biz C, Bernini A, Ruggieri P, Stecco C, et al. Myofascial points treatment with focused extracorporeal shock wave therapy (f-ESWT) for plantar fasciitis: An open label randomized clinical trial. Eur J Phys Rehabil Med. 2022;58(1):85-93. DOI: 10.23736/S1973-9087.21.06814-3.
6. Li X, Zhang L, Gu S, Sun J, Qin Z, Yue J, et al. Comparative effectiveness of extracorporeal shock wave, ultrasound, low-level laser therapy, noninvasive interactive neurostimulation, and pulsed radiofrequency treatment for treating plantar fasciitis: A systematic review and network meta-analysis. Medicine (Baltimore). 2018;97(43): e12819. DOI: 10.1097/MD.0000000000012819.
7. Akinoğlu B, Köse N, Kirdi N, Yakut Y. Comparison of the acute effect of radial shock wave therapy and ultrasound therapy in the treatment of plantar fasciitis: A randomized controlled study. Pain Med U S. 2017;18(12):2443-52. DOI: 10.1093/pm/pnx113.
8. Ordahan B, Türkoğlu G, Karahan AY, Akkurt HE. Extracorporeal shockwave therapy versus kinesiology taping in the management of plantar fasciitis: A randomized clinical trial. Arch Rheumatol. 2017;32(3):227-33. DOI: 10.5606/ArchRheumatol.2017.6059.
9. Rompe JD, Furia J, Cacchio A, Schmitz C, Maffulli N. Radial shock wave treatment alone is less efficient than radial shock wave treatment combined with tissue-specific plantar fascia-stretching in patients with chronic plantar heel pain. Int J Surg. 2015;24(Pt B):135-42. DOI: 10.1016/j.ijsu.2015.04.082.

10. Rahbar M, Eslamian F, Toopchizadeh V, Jahanjoo F, Kargar A, Dolatkhah N. A comparison of the efficacy of dry-needling and extracorporeal shockwave therapy for plantar fasciitis: A randomized clinical trial. Iran Red Crescent Med J. 2018;20(9). DOI: 10.5812/ircmj.68908.
11. Li S, Wang K, Sun H, Luo X, Wang P, Fang S, et al. Clinical effects of extracorporeal shock-wave therapy and ultrasound-guided local corticosteroid injections for plantar fasciitis in adults: A meta-analysis of randomized controlled trials. Medicine (Baltimore). 2018;97(50):e13687. DOI: 10.1097/MD.0000000000013687.
12. Çağlar Okur S, Aydın A. Comparison of extracorporeal shock wave therapy with custom foot orthotics in plantar fasciitis treatment: A prospective randomized one-year follow-up study. J Musculoskelet Neuronal Interact. 2019;19(2):178-86.
13. 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. J Bone Joint Surg Am. 2015;97(9):701-8. DOI: 10.2106/JBJS.M.01331.
14. Ibrahim MI, Donatelli RA, Hellman M, Hussein AZ, Furia JP, Schmitz C. Long-term results of radial extracorporeal shock wave treatment for chronic plantar fasciopathy: A prospective, randomized, placebo-controlled trial with two years follow-up: Radial ESWT for plantar fasciopathy. J Orthop Res. 2017;35(7):1532-8. DOI: 10.1002/jor.23403.
15. Roerdink RL, Dietvorst M, Zwaard BVD, van der Worp H, Zwerver J. Complications of extracorporeal shockwave therapy in plantar fasciitis: Systematic review. Int J Surg. 2017; 46:133-45. DOI: 10.1016/j.ijsu.2017.08.587.