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Advances in Rehabilitation for Plantar Fasciitis: A Comprehensive Review of Contemporary Approaches and Emerging Therapies

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ABSTRACT

Plantar fasciitis is one of the most common causes of heel pain in adults, resulting from repetitive micro trauma and inflammation of the plantar fascia due to excessive loading or faulty biomechanics. Despite a wide range of available treatment options, the most effective rehabilitation strategy remains a subject of ongoing research and clinical debate. This review explores advanced rehabilitation strategies for plantar fasciitis, focusing on conservative, contemporary, and emerging therapeutic approaches.

Recent systematic reviews, randomized controlled trials, meta analysis, and comprehensive review were thoroughly analyzed to evaluate the efficacy, functional outcomes, and clinical relevance of different conservative, contemporary, and emerging rehabilitation interventions used in the management of plantar fasciitis.

Conservative management, including stretching, the RICE protocol, patient education, manual therapy, and strengthening exercises, remains the keystone of plantar fasciitis management. Orthotics and low-Dye taping provide mechanical unloading and symptomatic relief. Advanced modalities such as extracorporeal shockwave therapy and photobiomodulation offer short-term benefits. Newer approaches, including platelet-rich plasma and high-intensity laser therapy, show potential but lack strong long-term evidence. Surgery should be reserved for unmanageable cases, as evidence regarding the optimal technique and long-term outcomes remains limited.

A combination of conservative, contemporary, and emerging rehabilitation strategies may improve recovery and reduce recurrence in plantar fasciitis. Further high-quality studies with standardized protocols and long-term follow-up are needed to clarify the most effective treatment pathways.



Keywords: plantar fasciitis, heel pain, rehabilitation, emerging therapies, contemporary approach, conservative care, review, surgical interventions.



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Abbreviations: RICE- Rest, ice, compression, elevation; ESWT- extracorporeal shockwave therapy; LDT- low dye taping; LVT- local vibration therapy; PRP- platelet rich plasma; HILT- high intensity laser therapy; LLLT- low level laser therapy; PBMT- photobiomodulation; MFR- myofascial release; MTPs- myofascial trigger points; VAS- visual analog scale; NRS- numerical rating scale; FHSQ- foot health status questionnaire; HTI- heel tenderness index; FAOS- foot ankle outcome score; FFI- foot function index; AOFAS- american orthopedic foot and ankle society; NSAIDs- non-steroidal anti-

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inflammatory drugs; DN- dry needling; PFPS- plantar fascia-specific stretching; ROM- range of motion; HEP- home exercise program; RCT – randomized controlled trials

INTRODUCTION

Plantar fasciitis is usually described as an inflammatory and degenerative process of the proximal plantar fascia, most often at its insertion site near the medial tuberosity of the calcaneus. Histopathological findings are degenerative changes in the plantar fascia with fibroblastic proliferation with minimal inflammatory tissue. The current literature suggests that microtears in the fascia, induced by repetitive mechanical overload and excess strain, may initiate an inflammatory cascade. The tissue may also fail to heal normally if it is subjected to prolonged repetitive stress, eventually resulting in chronic inflammation and progressive degeneration. [League, A. C. \(2008\)](#)

The severity can be as mild as tenderness at the origin of the plantar fascia, often noted on first steps after rest, to severe pain that may become disabling. The prevalence and incidence of plantar heel pain are unknown. It may affect athletes or those who are sedentary and does not appear to be influenced by gender. [Landorf, K. B. \(2015\)](#)

Reported prevalence varies by population, from around 4% in the general population, to 7% in older adults, and from 8% in athletes, to as high as 25% in runners. Women among non-athletes appear to be more frequently affected and may also have a higher risk of persistent symptoms than men. [Grim, C. et al \(2019\)](#)

In clinical practice, plantar fasciitis typically has an insidious onset with so-called “start-up pain,” a sharp stabbing pain along the plantar medial heel on arising from bed in the morning or after prolonged sitting. This pain usually disappears soon after weight bearing is initiated but may progress at the end of the day to dull, constant aching or throbbing discomfort that may radiate into the arch or forefoot. [League, A. C. \(2008\)](#)

The contemporary approaches and emerging therapies for plantar fasciitis can be divided into several categories. These include conservative care, such as the RICE protocol, stretching, and patient education; the role of orthotics and low-Dye taping; and physical therapy techniques, particularly manual therapy. Advanced modalities include extracorporeal shockwave therapy and photobiomodulation. Other treatment options include dry needling and local vibration therapy. Emerging interventions, such as platelet-rich plasma injections and high-intensity laser therapy, and lastly surgical interventions have been investigated.

This review gives an overview of the evidence for conservative, contemporary and emerging rehabilitation strategies for plantar fasciitis with respect to their clinical effectiveness and practical application.

METHODOLOGY

Search Strategy

A literature search was conducted using digital databases, including PubMed, Google Scholar, and Research Gate. The search focused on contemporary and rapidly adapt approaches in the management of plantar fasciitis.

The following keywords and combinations were searched: Plantar fasciitis, Plantar heel pain, Conservative management, Stretching, RICE therapy, Patient education, Orthotics, Low-Dye taping, Manual therapy, Strengthening exercises, Extracorporeal shockwave therapy, Photobiomodulation, Dry needling, Local vibration therapy, Platelet-rich plasma, High-intensity laser therapy, Surgical treatment.

Study Selection and Data Extraction

Studies were screened according to predefined eligibility criteria. Titles and abstracts were reviewed initially, followed by full-text assessment of potentially relevant articles. Data extracted from the included studies comprised: Author and Year, Intervention, Comparison Intervention, Outcome Measures and Results

Preference was given to randomized controlled trials, systematic reviews, systematic reviews with meta-analysis, and comprehensive review articles.

Table 1. Criteria for Study Selection

Category	Inclusion criteria	Exclusion criteria
Study design	Randomized controlled trials, systematic reviews, systematic reviews with meta-analysis, and comprehensive reviews	Editorials, letters, case reports, conference abstracts, and unrelated publications
Population	Adults with plantar fasciitis or plantar heel pain	Pediatric populations and populations without plantar fasciitis or plantar heel pain
Intervention	Conservative care, RICE therapy, stretching, strengthening, patient education, orthotics, low-dye taping, manual therapy, ESWT, photobiomodulation, dry needling, LVT, PRP, HILT, and surgical interventions.	Interventions unrelated to plantar fasciitis management
Language	English-language publications	Non-English publications without an accessible translation
Outcomes	Pain, function, foot mechanics, quality of life, tissue healing, treatment response, and adverse effects	Studies without relevant clinical or functional outcomes
Publication type	Full-text peer-reviewed articles	Duplicate publications and articles without sufficient information

RICE Protocol

The RICE protocol (rest, ice, compression, elevation) is often used in the early management of plantar fasciitis in the acute phase to reduce pain and local tissue stress. Rest reduces repetitive loading of the plantar fascia. Ice is used to reduce pain and modulate inflammatory symptoms. Compression and elevation can help control swelling but the specific benefit of these in plantar fasciitis is not well established. (TonyClinton C. Nweke. 2025), reported on their comprehensive review evidence (Table 2), suggests that RICE may provide short-term symptomatic relief, particularly during acute flare-ups; however, it does not address the underlying biomechanical or degenerative mechanisms of the condition. So while RICE can be a good initial supporting measure, its impact is usually short-term and not a standalone treatment.

Stretching

Stretching exercises are frequently used in the management of plantar fasciitis to decrease tension in the plantar fascia and the gastrocnemius–soleus complex. Stretching is biomechanically appropriate because limited ankle dorsiflexion and calf tightness are often linked with increased strain on the plantar fascia. The most commonly recommended techniques are plantar fascia-specific stretches and Achilles tendon stretches. (TonyClinton C. Nweke. 2025), in (Table 2), that the evidence reviewed suggests that stretching has benefits for pain and function, particularly when performed regularly over a period of weeks. In contrast to passive treatment modalities, stretching improves tissue extensibility and load distribution throughout the foot and thus addresses an important contributing factor. Several studies have reported better results with plantar fascia-specific stretching compared to generalized calf stretching alone. Importantly, stretching seems to support sustained symptom improvement instead of just temporary pain relief.

Patient Education

The education will provide information about the condition and practical strategies for self-management. (Franettovich Smith et al 2020), suggest that effective patient education for plantar heel pain should include knowledge of the problem, self-management strategies (including load monitoring and symptom response), footwear advice and posture/gait modification recommendations. The authors suggested that this could be provided alongside an advanced foot exercise programme in eight physiotherapist guided sessions over 12 weeks.

Orthotics

Orthotic devices are often prescribed to support the medial arch and redistribute plantar pressure during weight-bearing activities to minimize stress on the plantar fascia. They can help to reduce pain and improve function in patients with plantar fasciitis by promoting a more even distribution of load across the foot, increasing shock absorption and improving proprioception. In a randomized controlled trial (RCT) by (Amoako-Tawiah et al. 2023) in (Table 2), prefabricated foot orthotics alone were compared to orthotics in conjunction with orthotic sandals in individuals with plantar fasciitis. Both interventions resulted in significant improvement of pain and functional outcomes at six months. But, the combination of orthotics and orthotic sandals was related to greater pain reduction with statistically significant differences in favor of the combined intervention. Both groups showed functional improvement, but there was no statistically significant difference between the groups. These results suggest that continuous biomechanical support during daily activities can further decrease repetitive loading of the plantar fascia and improve symptom relief.

Low-Dye taping

Low-Dye taping (LDT) is a commonly used technique used to provide temporary external support to the medial longitudinal arch and decrease biomechanical stress on the plantar fascia. This is considered as one of the standard approaches in early plantar fasciitis management among the available taping methods. As shown in the systematic review by (Castro-Méndez et al. 2025) in (Table 2) The authors studied the comparative efficacy of iontophoresis and Low-Dye taping as conservative therapeutic strategies for plantar fasciitis. The review combined results of several clinical trials, some of which looked at the use of Low-Dye taping alone and others that looked at its use with iontophoresis. The results suggest that Low-Dye taping is a low risk conservative treatment that may be clinically useful in providing short term pain relief and improving outcomes when used in conjunction with other therapies. The authors however pointed out several limitations of the evidence available including methodological heterogeneity, small sample sizes, and short follow-up periods. Therefore, while Low-Dye taping seems to have a short-term benefit, further well-designed randomized trials are necessary to establish its long-term effectiveness and the optimal protocol of application.

Manual Therapy

Manual therapy for plantar heel pain is generally performed by mobilizing joints and soft tissue techniques, such as deep tissue massage and myofascial release. Joint mobilization is used to improve range of motion, reduce pain, and address soft tissue restriction and swelling. Myofascial release (MFR) is low-load, sustained stretching of the myofascial system to restore tissue length, reduce pain, and improve function. The rationale for exploring manual therapy as a conservative intervention in this study was that symptoms of plantar fasciitis could be influenced by joint stiffness, soft tissue tightness and altered lower-limb biomechanics as well as plantar fascia pathology (Pollack et al. 2018) in (Table 2). Results showed significant pain relief after manual therapy particularly in relation to walking and first step weight bearing. Functional outcomes also improved, indicating a better ability to perform activities of daily living. The benefits were attributed to increased ankle and foot mobility, decreased soft tissue stiffness and reduced abnormal mechanical stress on the plantar fascia. Manual therapy does not seem to have a direct effect on the structure of the plantar fascia but seems to work by optimizing movement and load distribution to decrease pain and improve function.

Extracorporeal Shockwave Therapy (ESWT)

Extracorporeal shock wave therapy (ESWT) is a non-invasive modality that uses high-energy acoustic waves to promote tissue repair, induce neovascularization, and facilitate collagen remodeling of the plantar fascia. Laboratory studies show that shock wave exposure can influence cell activity by changing the expression of mRNA and boosting growth factors such as TGF- β 1, collagen I and collagen III, which are all involved in tissue healing. (Simental-Mendía et al. 2024), ESWT was evaluated in patients with plantar fasciitis and the outcomes were plantar fascia thickness and pain. Results showed in (Table 2), that ESWT was effective in reducing the thickness of the fascia plantaris indicating a positive effect on tissue structure. Thicker fascia is often correlated with chronic symptoms and thus is clinically relevant. But ESWT did not provide statistically significantly better pain relief than other standard nonsurgical treatments like physical therapy, stretching, or orthotic use.

Photobiomodulation

Photobiomodulation therapy (PBMT) is a light intervention that employs low intensity, non-thermal levels of visible and near-infrared light to stimulate cellular activity and accelerate tissue healing. Light energy absorbed by chromophores may decrease oxidative stress, increase adenosine triphosphate production and may contribute to pain reduction. The evidence reviewed in the present study was reported by (Ferlito et al. 2023) in (Table 2). PBMT alone or combined with exercise was associated with significant short-term reductions in pain intensity. PBMT also appeared to offer greater pain relief than extracorporeal shockwave therapy. However, there was no significant benefit for long-term pain or disability outcomes compared to other interventions. PBMT alone was more effective in the short-term than exercise and when combined with exercise, PBMT was more effective in the short-term suggesting a possible synergistic effect. However, the use of PBMT combined with other electrotherapeutic modalities did not seem to improve outcomes further. In general, PBMT appears to be a useful conservative intervention for short-term pain relief in plantar fasciitis, with some support for functional improvement when combined with exercise, but long-term benefits are uncertain.

Dry Needling

Dry needling is a minimally invasive procedure that targets myofascial trigger points and is often viewed as an alternative treatment option for chronic pain. It is believed to alter the biochemical environment of trigger points and decrease spontaneous electrical activity in the involved muscle tissue. (Eftekhsadat et al. 2016), in (Table 3), reported that trigger point dry needling was evaluated as a conservative intervention for chronic plantar fasciitis, with attention to the possible role of myofascial trigger points in the calf muscles. The authors suggested that chronic plantar heel pain could be related to not only plantar fascia pathology but also increased muscle tension and changed neuromuscular activity. The results showed that dry needling was effective in reducing the intensity of pain significantly, especially in daily activities. The pain related functional scores also improved indicating better tolerance to the walking and weight bearing tasks. However, no significant changes were found in the range of motion of the ankle. This suggests that dry needling is more likely to affect pain modulation and muscle function than joint mobility or biomechanical alignment.

Local Vibration Therapy

Local vibration therapy is a non-invasive, conservative treatment that is believed to enhance blood flow, improve oxygen consumption and assist in the reduction of pain. It is clinically and sport rehabilitation used for pain, muscle soreness and fatigue. (On J et al. 2023) Local vibration therapy as adjunctive treatment of plantar fasciitis. In (Table 3). The authors concluded that local vibration therapy is more beneficial as a component of a multimodal rehabilitation program than as a standalone intervention. It does not directly correct structural abnormalities of the plantar fascia but it appears to reduce pain and improve function, especially in the short term. The therapy was described as safe, easy to deliver and well tolerated, which may make it a useful option for patients who may not be able to tolerate more aggressive treatments. In summary, local vibration therapy may be a useful adjunct to stretching, strengthening and orthotic support in the conservative management of plantar fasciitis.

PRP Injections

Platelet-rich plasma (PRP) is prepared by centrifuging whole blood and isolating the platelet concentration above that in whole blood. It is thought to promote tissue repair by releasing growth factors such as platelet-derived growth factor, transforming growth factor beta, fibroblast growth factor and insulin-like growth factor that may aid and accelerate the natural healing process. (Xing et al. 2021) in (Table 3), executed a systematic review and meta-analysis of 12 randomised controlled trials (653 patients) examine the successfulness of platelet-rich plasma (PRP) injections in related to corticosteroid injections for the treatment of plantar fasciitis. They found that PRP was coupled with remarkably less pain at six months, one year and one and half years compared with corticosteroids. Moreover, PRP had higher functional outcomes at the one year follow-up. However, in the short term (1-3 months), no substantial alterations were identified. The researchers found that PRP was superior to steroid injections in the mid-term pain relief and functional improvement in patients with plantar fasciitis.

High Intensity Laser Therapy

High intensity laser therapy (HILT) is a laser radiation that is slowly absorbed by melanin and other chromophores causing photochemical and photobiological effects at tissue level . This could enhance mitochondrial activity, boost adenosine triphosphate production, and aid RNA and DNA synthesis, which in turn can stimulate tissue. In addition, photochemical and photothermal effects of HILT can promote collagen production, increase blood flow, enhance vascular permeability, and have anti-inflammatory effects. Therefore, HILT can be helpful in tissue repair and reduction of pain related stimuli. In the trial by (Ordahan et al. 2018) in (Table 3.) HILT and low-level laser therapy (LLLT) both achieved significant Improvements in pain, tenderness, function and quality of life in patients with plantar fasciitis after three weeks of treatment. However, HILT was more effective than LLLT in all outcomes. These findings suggest that laser therapy may be effective for reducing symptoms and improving function in plantar fasciitis and that HILT may be better than LLLT for short-term outcomes.

Surgical Interventions

Plantar fasciitis is a common cause of chronic heel pain, and surgery is generally reserved for the small proportion of patients whose symptoms are persistent despite six to 12 months of conservative treatment. The condition may be associated with myxomatous degeneration, calcification of connective tissue, and disorganization of collagen fibers in the plantar fascia. Historically, the principal operative treatment has been surgical release, either by open or endoscopic approaches. However, partial or complete release of the fascia may cause medial column instability, overload of the lateral column, and ongoing pain. Surgical release has been reported to be successful in a large proportion of cases, but there are still concerns about complications such as flattening of the longitudinal arch and heel hypoesthesia. (Nayar et al. 2023) in (Table 2), performed a systematic review and network meta-analysis of surgical interventions for refractory plantar fasciitis, including open and endoscopic plantar fasciotomy, gastrocnemius release, radiofrequency microtenotomy, and surgical dry needling. The authors concluded that surgical interventions can provide effective short and medium-term relief in patients that are not amenable to non-operative management. Improvements in pain and function support surgery as a possible treatment option in resistant cases. But the review also highlighted gaps in the evidence base, including a lack of good-quality randomized trials directly comparing surgical techniques. Therefore, although a surgical procedure may be of benefit, the long-term results and the best procedure have not yet been clearly established.

RESULTS

Table 2. Contemporary Approaches in the Management of Plantar Fasciitis

Author and Year	Intervention	Comparison Intervention	Outcome Measures	Results
<u>Tony Clinton C. Nweke, (2025)</u>	Conservative management including stretching exercises and RICE protocol (rest, ice, compression, elevation)	Not applicable; no comparison group included.	Pain reduction assessed by VAS; functional improvement assessed by Foot and Ankle Outcome Score (FAOS)	Early conservative management such as stretching and the RICE protocol were correlated with less heel pain and better function in mild to moderate cases. Generally, symptomatic relief was observed within six to eight weeks. Stretching exercises were related to less heel pain and better functional outcomes, especially in mild to moderate plantar fasciitis. Plantar fascia specific stretching appeared to have more consistent and sustained results than generalized stretching with most patients improving

				within six to eight weeks. Stretching appears to have long-term benefit over RICE alone in the plantar fascia.
<u>Amoako-Tawiah et al. (2023)</u>	Prefabricated foot orthotics combined with orthotic sandals	Prefabricated foot orthotics alone	Foot pain measured by Numerical Rating Scale (NRS); foot function measured by the Foot Health Status Questionnaire (FHSQ) function subscale.	Both groups showed significant improvements in pain and function. However, the combined orthotic and sandal group demonstrated more benefit with statistically significant improvement in pain scores compared with orthotics alone. These results suggest that prolonged biomechanical support may provide additional symptom relief.
<u>Castro-Méndez et al. (2025)</u>	Low dye Taping	Iontophoresis or combined LDT + Iontophoresis	Pain reduction, functional improvement	Low-Dye taping is effective for short-term pain relief and improvement in foot function in plantar fasciitis. A greater effect was observed when used with iontophoresis suggesting a possible additive or synergistic effect. In conclusion, Low-Dye taping seems to be a useful conservative treatment.
<u>Pollack et al. (2018)</u>	Manual therapy techniques targeting foot and ankle joints, combined with standard conservative care	Standard conservative care without manual therapy	Pain Intensity (VAS), Functional outcome measures	It was concluded that manual therapy may be an effective conservative treatment option for plantar fasciitis, especially as part of a multimodal rehabilitation program. They emphasised that manual therapy should not be used in isolation but combined with stretching, exercise and other conservative modalities to optimise clinical outcomes. Overall, the study supports the use of manual therapy as a safe, low risk intervention that contributes meaningfully to pain reduction and functional improvement in individuals with plantar fasciitis.
<u>Simental-Mendía et al. (2024)</u>	Extracorporeal Shockwave Therapy (ESWT)	Standard conservative treatments (e.g., stretching,	Plantar fascia thickness (imaging), Pain (VAS)	ESWT was associated with a significant reduction in plantar fascia thickness, indicating favorable structure

		physical therapy, orthotics)		changes. However, pain outcomes were not significantly better than those seen with standard conservative treatments. These results suggest ESWT may benefit tissue level improvement, but its analgesic benefit may be similar to other non-surgical options.
<u>Ferlito et al. (2023)</u>	Photobio-modulation Therapy (PBMT), either alone or combined with exercise	Placebo, other conservative interventions (e.g., ESWT, ultrasound therapy), or exercise alone	Pain intensity (VAS, numerical scales), Disability and functional outcomes e.g., Foot Function Index (FFI)	PBMT has a significant effect on short-term pain reduction in plantar fasciitis. The functional outcomes also improved when combined with exercise. But long-term pain and disability outcomes were similar to those of other conservative interventions, suggesting that the main value of PBMT is in short-term symptom relief.
<u>Nayar et al. (2023)</u>	Open/endoscopic plantar fasciotomy, gastrocnemius release, radiofrequency microtenotomy, and dry needling	Compared across surgical techniques and/or with non-operative history	Pain (VAS), Function	Surgical interventions were associated with significant improvement in pain and function for refractory plantar fasciitis. No procedure was clearly superior, and the available evidence supports surgery primarily for short- to medium-term symptom relief in patients who have failed conservative management.

Table 3. Emerging Therapies for Plantar Fasciitis

Author and Year	Intervention	Comparison Intervention	Outcome Measures	Results
<u>Eftekharsadat et al. (2016)</u>	Trigger point dry needling of calf muscles combined with routine conservative care	Routine conservative care alone	Pain intensity (VAS), Foot functional scores, Ankle ROM	Dry needling was associated with significant improvement in pain and function. Ankle range of motion was unchanged. This suggests that dry needling is best used as an adjunctive intervention for pain modulation as part of a more comprehensive conservative rehabilitation program.

<u>On J et al. (2023)</u>	Local vibration therapy applied to the plantar region	Conventional care / baseline condition	Pain Intensity (VAS), Functional outcome measures	Local vibration therapy was associated with significant short-term reductions in pain and improvements in function. It was well tolerated and appears to be useful as an adjunctive conservative intervention in a multimodal rehabilitation program.
<u>Xing et al. (2021)</u>	Platelet-rich plasma (PRP) injection into the plantar fascia	Corticosteroid injection	Visual Analog Scale (VAS) for pain and American Orthopaedic Foot and Ankle Society (AOFAS) score for function	PRP group had significantly lower pain scores at six months, one year, and one and half years compared to corticosteroids. PRP group showed better functional outcomes at one year follow-up. No significant difference between groups in short-term (1-3 months). It concluded that PRP is more effective than steroid injection for mid-term pain relief and functional improvement in plantar fasciitis patients
<u>Ordahan et al. (2018)</u>	High-Intensity Laser Therapy (HILT) applied three times per week for three weeks, in combination with silicone insoles and stretching exercises	Low-Level Laser Therapy (LLLT) with the same treatment frequency and adjunct therapies	Pain intensity measured by VAS; heel tenderness measured by HTI (Heel Tenderness Index), functional status and quality of life measured by FAOS	Both HILT and LLLT showed significant association with improvement in pain, tenderness and function after treatment. However, HILT showed more benefits in all measured outcomes, which indicates that HILT is more effective in conservative management of plantar fasciitis.

DISCUSSION

The included literature comprised comprehensive review, randomised controlled trials, systematic reviews and systematic reviews with meta-analysis. This distribution shows that the topic has been investigated at multiple levels of evidence, with some conservative and advanced interventions having stronger evidence than others. This overall review proposes that plantar fasciitis is best treated with a stepwise rehabilitation rather than a single definitive treatment. Conservative management is the mainstay of care especially in the early phases. Rest, ice, stretching, patient education, orthotics and LDT are all effective in providing short-term relief and reducing mechanical stresses on the plantar fascia. The most reliable benefits of conservative interventions include plantar fascia-specific stretching, calf stretching, orthotics, low-dye taping, manual therapy, and strengthening exercises. These techniques improve pain, flexibility and foot mechanics, and help recovery and reduce the risk of recurrence. Manual therapy is particularly useful if symptoms are due to restricted ankle mobility and tight soft tissues. Advanced modalities such as ESWT and PMBT may provide some additional benefit in patients who do not fully respond to first-line treatment. ESWT could enhance tissue healing and structure and PMBT has a predominantly short-term pain relief effect. However, their effectiveness is variable between studies and should be

considered as adjuncts rather than substitutes of conventional rehabilitation. Some promising emerging interventions such as dry needling, LVT, PRP injections, and HILT have early findings that are encouraging but warrant further investigation. These treatments may help to reduce pain and help healing but the evidence is at this time still limited compared to the standard conservative approaches. Surgical intervention should be reserved for patients with symptoms after a minimum of six months of well-conducted conservative management.

CONCLUSION

These results suggest a stepwise approach to the management of plantar fasciitis. Most patients can be effectively treated with low-cost conservative treatments including stretching of the plantar fascia and Achilles tendon, strengthening exercises, patient education, taping and prefabricated orthotics. Keep these up for several weeks to months before you think about adding other therapies. For persistent or chronic conditions, additional benefits may be obtained with extracorporeal shockwave therapy, photobiomodulation, high-intensity laser therapy and platelet-rich plasma injections, but further research is needed to establish the long-term efficacy and appropriate protocols. Surgery should be the last option for patients who have failed conservative and other non-surgical therapy for approximately 6-12 months due to the dangers and long recovery. Future research should focus on standardized techniques, longer follow-up, and direct comparison of therapies. Generally, the best and least invasive option is conservative management and advanced therapies well chosen.

AUTHOR DECLARATIONS

CRedit Author Statement / Author contributions

Aditi Gupta: Conceived and designed the review; conducted the literature search and screening; performed data extraction and synthesis; wrote the original draft of the manuscript; prepared figures and tables

Gowrishankar Potturi: Supervised the review process; provided guidance on methodology and structure; critically reviewed and revised the manuscript for important intellectual content; approved the final version

Neha Dubey: Reviewed and approved the final manuscript.

Mayank Kumar: Reviewed

KB Ranjeet Singh Chaudhary: Reviewed

Anjali Agarwal: Reviewed

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REFERENCES

- Amoako-Tawiah, P., Love, H., Chacko Madathilethu, J., lacourse, J., Fortune, A. E., Sims, J. M. G., & Ampat, G. (2023). Use of orthotics with orthotic sandals versus the sole use of orthotics for plantar fasciitis: Randomised controlled trial. *World Journal of Orthopaedics*, 14(9), 707-719. <https://doi.org/10.5312/wjo.v14.i9.707>
- Castro-Méndez, A., Roldán-Fernández, L., Tovaruela-Carrión, N., & [et al.]. (2025). Comparative effectiveness of iontophoresis vs. Low Dye taping in plantar fasciitis: A systematic review. *Indian Journal of Orthopaedics*, 60(1), 44-56. <https://doi.org/10.1007/s43465-025-01477-4>

- Eftekharsadat, B., Babaei-Ghazani, A., & Zeinolabedinzadeh, V. (2016). Dry needling in patients with chronic heel pain due to plantar fasciitis: A single-blinded randomized clinical trial. *Medical Journal of the Islamic Republic of Iran*, 30, 401.
- Ferlito, J. V., Silva, C. F., Almeida, J. C., Pinto, R. M., & de Paula, A. M. (2023). Effects of photobiomodulation therapy (PBMT) on the management of pain intensity and disability in plantar fasciitis: Systematic review and meta-analysis. *Lasers in Medical Science*, 38(1), 163. <https://doi.org/10.1007/s10103-023-03823-0>
- Franettovich Smith, M. M., Collins, N. J., Mellor, R., Munteanu, S. E., Menz, H. B., & Vicenzino, B. (2020). Foot exercise plus education versus wait and see for the treatment of plantar heel pain (FEET trial): A protocol for a feasibility study. *Journal of Foot and Ankle Research*, 13, 20. <https://doi.org/10.1186/s13047-020-00384-1>
- Grim, C., Kramer, R., Engelhardt, M., John, S. M., Hotfiel, T., & Hoppe, M. W. (2019). Effectiveness of manual therapy, customised foot orthoses and combined therapy in the management of plantar fasciitis—ARCT. *Sports*, 7(6), 128. <https://doi.org/10.3390/sports7060128>
- Landorf, K. B. (2015). Plantar heel pain and plantar fasciitis. *BMJ Clinical Evidence*, 2015, 1111. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4661045/>
- League, A. C. (2008). Current concepts review: Plantar fasciitis. *Foot & Ankle International*, 29(3), 358-366. <https://doi.org/10.3113/FAI.2008.0358>
- Nayar, S. K., Alcock, H., & Vemulapalli, K. (2023). Surgical treatment options for plantar fasciitis and their effectiveness: A systematic review and network meta-analysis. *Archives of Orthopaedic and Trauma Surgery*, 143(8), 4641-4651. <https://doi.org/10.1007/s00402-022-04739-0>
- Nweke, T. C. (2025). Comprehensive review and evidence-based treatment framework for optimizing plantar fasciitis diagnosis and management. *Cureus*, 17(7), e88745. <https://doi.org/10.7759/cureus.88745>
- On, H., & Yim, J. (2023). Effects of local vibration combined with extracorporeal shock wave therapy in plantar fasciitis: A randomized controlled trial. *Journal of Rehabilitation Medicine*, 55, jrm12405. <https://doi.org/10.2340/jrm.v55.12405>
- Ordahan, B., Karahan, A. Y., & Kaydok, E. (2018). The effect of high-intensity versus low-level laser therapy in the management of plantar fasciitis: A randomized clinical trial. *Lasers in Medical Science*, 33(6), 1363-1369. <https://doi.org/10.1007/s10103-018-2497-6>
- Pollack, Y., Shashua, A., & Kalichman, L. (2018). Manual therapy for plantar heel pain. *The Foot*, 34, 11-16. <https://doi.org/10.1016/j.foot.2017.08.001>
- Simental-Mendía, M., Simental-Mendía, L. E., Sánchez-García, A., Sahebkar, A., Jamialahmadi, T., Vilchez-Cavazos, F., Peña-Martínez, V. M., & Acosta-Olivo, C. (2024). Effect of extracorporeal shockwave therapy on plantar fascia thickness in plantar fasciitis: A systematic review and meta-analysis of randomized controlled trials. *Archives of Orthopaedic and Trauma Surgery*, 144(8), 3503-3516. <https://doi.org/10.1007/s00402-024-05464-6>
- Xing, F., Li, L., Hu, L., Chen, W., & Xiang, Z. (2021). Platelet-rich plasma has better mid-term clinical results than traditional steroid injection for plantar fasciitis: A systematic review and meta-analysis. *Orthopaedics & Traumatology: Surgery & Research*, 107(6), 103007. <https://doi.org/10.1016/j.otsr.2021.103007>