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Systematic Review

Multimodal physiotherapy in the management of plantar fasciitis: A narrative systematic review

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Abstract

Background: Plantar Fasciitis (PF) is one of the most common causes of heel pain, affecting a significant proportion of the adult population. Despite the availability of various treatment modalities, there remains variability in clinical practice and outcomes.

Objective: To systematically review and critically analyze the effectiveness of evidence-based physiotherapeutic interventions in the management of PF.

Methods: A systematic review and qualitative evidence synthesis were conducted in accordance with PRISMA guidelines. Electronic databases including PubMed, Google Scholar, Scopus, and Cochrane Library were searched for studies published between 2003 and 2025. Randomized controlled trials (RCT) evaluating physiotherapy interventions for PF were included. Data extraction and methodological quality assessment were performed using standardized tools.

Results: A total of 45 studies met the inclusion criteria and were included for qualitative synthesis and critical review. Evidence suggests that exercise therapy, particularly plantar fascia-specific stretching and strengthening, is the most effective intervention. Manual therapy combined with exercise showed superior outcomes compared to isolated treatments. Extracorporeal shock wave therapy (ESWT) demonstrated significant benefits in chronic cases. Adjunctive modalities such as LLLT, TUS, and TENS showed variable results. Emerging techniques including dry needling and MFR indicated promising short-term outcomes.

Conclusion: Physiotherapeutic management of PF is most effective when delivered through a multimodal, individualized approach. Exercise therapy remains the cornerstone of treatment, supported by manual therapy and selected adjunctive modalities. Further high-quality research is required to establish standardized protocols and long-term effectiveness.

Keywords: Plantar fasciitis, Physiotherapy, Exercise therapy, Manual therapy, ESWT, Rehabilitation, Evidence-based practice

Introduction

Plantar fasciitis (PF) is one of the most prevalent musculoskeletal disorders affecting the foot and remains a leading cause of heel pain and functional disability worldwide. It is estimated to affect approximately 10% of the population during their lifetime and accounts for nearly 10–15% of all foot-related clinical presentations [1]. The condition is particularly common among middle-aged adults, runners, overweight individuals, and those engaged in occupations requiring prolonged standing or walking [2]. Clinically, PF is characterized by pain at the medial aspect of the heel, most pronounced during the first steps after periods of rest, reflecting its load-dependent and mechanically driven nature [3].

Despite its high prevalence, the pathophysiological understanding of PF has evolved considerably. Traditionally regarded as an inflammatory condition, contemporary histopathological evidence

indicates that PF is predominantly a degenerative disorder, more accurately described as plantar fasciosis. Repetitive microtrauma results in collagen degeneration, fibroblast proliferation, disorganized tissue architecture, and reduced vascularity [4]. This paradigm shift has important clinical implications; however, many treatment strategies continue to be based on outdated inflammatory models, highlighting a disconnect between current evidence and clinical practice.

Physiotherapy is widely recommended as the first-line conservative treatment for PF [5], incorporating interventions such as stretching, strengthening, manual therapy, taping, orthoses, and electrotherapeutic modalities. While Plantar Fascia-specific stretching and Achilles tendon stretching have demonstrated improvements in pain and function [6], these benefits are largely short-term, and their long-term effectiveness remains uncertain. Moreover, inconsistencies in stretching protocols and patient adherence limit the generalizability of these findings. Similarly, strengthening exercises targeting intrinsic foot muscles and the calf complex are proposed to enhance arch stability and biomechanical control [7]; however, robust comparative evidence supporting their superiority or optimal dosing parameters remains limited.

Recent clinical practice guidelines (2023) advocate a multimodal treatment approach, combining stretching, manual therapy, taping, and patient education [2]. Although this recommendation reflects a more comprehensive strategy, it is primarily based on heterogeneous evidence with considerable variability in study design, intervention protocols, and outcome measures. Manual therapy techniques, including myofascial release and joint mobilization, have shown potential in improving both clinical outcomes and sonographic indicators of tissue healing [8]. Nevertheless, the independent contribution of manual therapy beyond exercise-based interventions remains inadequately established, raising questions regarding its true clinical value and cost-effectiveness. While guidelines support its integration with exercise therapy [9], the lack of high-quality comparative trials limits the strength of these recommendations.

Systematic reviews and meta-analyses have increasingly emphasized the potential superiority of combined or multimodal interventions over single-modality treatments [10]. However, these conclusions are constrained by significant heterogeneity and methodological limitations across studies, including small sample sizes and inconsistent outcome reporting. Adjunctive modalities such as extracorporeal shock wave therapy (ESWT) have demonstrated promising results, particularly in chronic or refractory cases, with meta-analytic evidence indicating significant improvements in pain and function [11]. Despite these findings, variability in treatment parameters, patient selection, and follow-up duration limits the reproducibility and clinical applicability of ESWT outcomes.

Similarly, emerging interventions such as dry needling and myofascial release techniques have shown potential benefits in reducing pain and improving mobility through modulation of myofascial dysfunction and local circulation [12]. However, the current evidence base is limited by short-term follow-up and a lack of rigorously designed randomized controlled trials, thereby restricting confidence in their long-term efficacy. Recent literature continues to support the role of non-surgical interventions, particularly when individualized to patient characteristics [13]; however, it also underscores the persistent absence of standardized treatment protocols and definitive clinical pathways.

Despite the expanding body of research, the management of PF remains characterized by substantial variability, methodological inconsistencies, and a lack of consensus regarding optimal treatment strategies. No single intervention has emerged as a universally accepted gold standard, and the relative effectiveness of different physiotherapeutic approaches remains unclear. Consequently, there is a critical need for a comprehensive and methodologically robust evaluation of existing interventions to identify the most effective, evidence-based strategies for clinical practice and to address the persistent gaps in the literature.

Materials and Methods

Detailed search strategies

The literature search was conducted systematically across major electronic databases, including PubMed, Google Scholar, EBSCO, Cochrane Library, PEDro, Embase, Scopus, and Web of Science. A comprehensive search strategy was implemented using both Medical Subject Headings (MeSH) and relevant free-text terms such as "Plantar fasciitis", "Physiotherapy", "Exercise therapy", "Manual therapy", "Electrotherapy", "ESWT", "TENS", "Dry needling" and "Rehabilitation". Additionally, reference lists of selected articles were manually screened to identify any further relevant studies not retrieved through the database search.

Study selection process

The search results from all databases were exported into reference management software, and duplicate records were removed. Two independent reviewers screened titles and abstracts for relevance. Full-text articles were then assessed according to predefined inclusion and exclusion criteria. Any disagreements were resolved through discussion and consensus. **Figure 1** showed the PRISMA flow chart of the present study.

Inclusion criteria

The inclusion criteria were: randomized controlled trials (RCTs), adult participants diagnosed with plantar fasciitis, studies evaluating physiotherapy or rehabilitation interventions, English-language publications, and studies published between 2003 and 2025.

Exclusion criteria

The exclusion criteria were: case reports or case series, narrative reviews and expert opinions, surgical intervention studies, non-English publications, studies involving mixed pathological populations without separate PF analysis, and studies with incomplete outcome data.

Risk-of-bias assessment

The methodological quality and risk of bias of the included randomized controlled trials were evaluated using the Cochrane Risk of Bias (RoB 2) tool and PEDro scale criteria (**Table 1**). The following domains were assessed: Random sequence generation (selection bias), Allocation concealment (selection bias), Blinding of participants and personnel (performance bias), Blinding of outcome assessment (detection bias), Incomplete outcome data (attrition bias), Selective reporting (reporting bias), Other sources of bias. The risk of bias for each study was categorized as: Low Risk (L), Some Concerns/Unclear Risk (U) and High Risk (H).

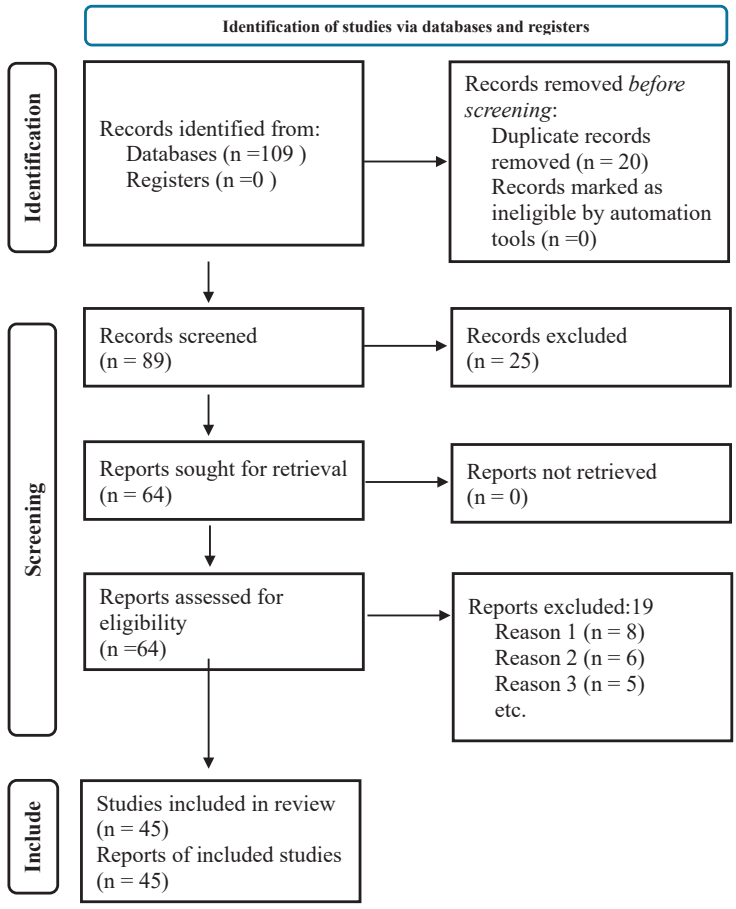

Figure 1. PRISMA flow chart of the present study.

Table 1. Risk-of-Bias assessment of included randomized controlled trials.

Author (Year)	RSG	AC	BPP	BOA	IOD	SR	OB	Overall Risk
DiGiovanni *et al.* [14]	L	L	U	L	L	L	L	Low
Rathleff *et al.* [15]	L	U	U	L	L	L	L	Low
Kamonseki *et al.* [16]	L	U	H	U	L	L	U	Some concerns
Dedes *et al.* [17]	L	L	U	L	L	L	L	Low
Becerro-de-Bengoa-Vallejo *et al.* [18]	L	U	U	U	L	L	U	Some concerns
Tsai *et al.* [19]	U	U	H	U	L	U	U	High
Radford *et al.* [20]	L	L	U	L	L	L	L	Low
Narlawar *et al.* [21]	U	U	H	U	L	U	U	High
Grim *et al.*]22]	L	L	U	L	L	L	L	Low
Yelverton *et al.* [23]	L	U	U	U	L	L	U	Some concerns
Ajimsha *et al.* [24]	L	U	H	U	L	L	U	Some concerns
Cotchett *et al.* [25]	L	L	L	L	L	L	L	Low
Ulusoy *et al.* [26]	L	U	U	U	L	L	U	Some concerns
Eslamian *et al.* [27]	L	U	U	U	L	L	U	Some concerns
Khammas *et al.* [8]	L	L	U	L	L	L	L	Low

RSG: Random Sequence Generation; AC: Allocation Concealment; BPP: Blinding of Participants and Personnel; BOA: Blinding of Outcome Assessment; IOD: Incomplete Outcome Data; SR: Selective Reporting; OSB: Other Sources of Bias; L: Low Risk; U: Some Concerns/Unclear Risk; H: High Risk

Protocol registration details

The review protocol for this systematic review titled *"Multimodal Physiotherapy in the Management of Plantar Fasciitis: A Narrative Systematic Review"* was developed prior to the commencement of the literature search in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and recommendations for evidence synthesis in rehabilitation research.

As this review represents a narrative systematic review with qualitative evidence synthesis and does not include a formal quantitative meta-analysis, the protocol was not prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO). However, the review methodology, inclusion and exclusion criteria, search strategy, study selection process, data extraction methods, and quality assessment procedures were predefined and consistently followed throughout the study to minimize reporting bias and enhance methodological transparency.

The protocol included: clearly defined research objectives and review questions, eligibility criteria based on PICOS framework, comprehensive database search strategy, independent screening and study selection procedures, standardized data extraction process, methodological quality assessment using PEDro Scale (**Table 2**) and Cochrane Risk-of-Bias criteria, and narrative qualitative synthesis approach. The review was conducted according to the PRISMA 2020 statement for systematic reviews.

Results

A total of 45 studies were included in this review, with key randomized controlled trials (2003–2025) summarized to evaluate the effectiveness of physiotherapeutic interventions in PF.

Stretching and strengthening

Combined strengthening and stretching interventions were found to provide the greatest improvement in pain and function in individuals with PF [7,16]. High-load strength training demonstrated superior long-term outcomes compared to stretching alone [15]. Plantar Fascia-specific stretching was more effective than calf or Achilles tendon stretching in reducing pain and improving function [28,14]. Strengthening of intrinsic foot muscles contributed to significant improvements in pain and functional ability [29,30]. Biomechanical evidence also indicated that dorsiflexion of the toes increases the effectiveness of plantar fascia stretching [31] (**Table 3**).

Kinesio taping

Kinesio taping was shown to provide short-term pain relief in patients with PF [17,19,20]. It also contributed to a reduction in plantar fascia thickness [18,32]. Evidence from systematic reviews suggests that kinesio taping offers small to moderate benefits, primarily in the short term [33,34] (**Table 4**).

Manual therapy

Manual therapy was effective in improving pain and functional outcomes in individuals with PF [21,37,38]. Multimodal approaches combining manual therapy with other interventions such as exercise or orthoses were found to be the most effective [24,21,22]. Techniques such as myofascial release demonstrated significant improvements in pain, range of motion, and function [24]. Recent evidence further supports the inclusion of manual therapy as part of a comprehensive rehabilitation program [5,8,10,35] (**Table 5**).

Dry needling, ESWT, LLLT, and other modalities

Dry needling was found to be effective in reducing pain and improving function in PF [25,40,42,45]. Extracorporeal shockwave therapy (ESWT) was more effective than ultrasound therapy [UST] in reducing pain [26]. Low-level laser therapy (LLLT) provided short-term pain relief [41]. Both TENS and UST were effective modalities, although TENS was found to be more beneficial in acute pain conditions [39]. Overall, multimodal treatment approaches combining different therapies yielded the best outcomes [44] (**Table 6**).

Table 2. PEDro scale quality assessment of included studies.

Study	PEDro Score (/10)	Methodological Quality
DiGiovanni *et al.* [14]	8	High
Rathleff *et al.* [15]	8	High
Kamonseki *et al.* [16]	7	Moderate–High
Dedes *et al.* [17]	8	High
Becerro-de-Bengoa-Vallejo *et al.* [18]	7	Moderate–High
Tsai *et al.* [19]	5	Moderate
Radford *et al.* [20]	8	High
Narlawar *et al.* [21]	5	Moderate
Grim *et al.* [22]	8	High
Yelverton *et al.* [23]	7	Moderate–High
Ajimsha *et al.* [24]	6	Moderate
Cotchett *et al.* [25]	9	High
Ulusoy *et al.* [26]	7	Moderate–High
Eslamian *et al.* [27]	7	Moderate–High
Khammas *et al.* [8]	8	High

Table 3. Description of detailed literature reviewed on stretching and strengthening training for the management of plantar fasciitis.

Year	Author	Sample size	Intervention	Outcome measures	Key findings
2024	Bertolini *et al.* [7]	68	Strengthening + stretching	FFI, ROM	Combined exercise most beneficial
2020	Rathleff *et al.* [15]	60	High-load strength training vs stretching	VAS, Foot Function Index (FFI)	Strength training showed superior long-term outcomes
2020	Siriphorn *et al.* [28]	Multiple studies	Calf vs PF-specific stretching	Pain, function	Both effective; PF-specific slightly superior
2017	Huffer *et al.* [29]	Multiple studies	Strength training (intrinsic foot muscles)	Pain, function	Improves pain & foot function
2017	Scherger *et al.* [30]	Not specified	Muscle strengthening	Pain, Function	Strengthening beneficial for plantar fasciitis
2016	Kamonseki *et al.* [16]	~60	Stretching ± strengthening (foot & hip)	Pain (VAS), function	Combined (stretch + strengthening) more effective
2007	Flanigan *et al.* [31]	Not specified	PF stretching with different foot positions	PF strain (biomechanical analysis)	Dorsiflexed toes ↑ PF stretch effectiveness
2006	DiGiovanni *et al.* [14]	101	PF-specific vs Achilles stretch	VAS, FFI	PF stretch more effective (pain & function), sustained at 2 yrs

Table 4. Description of detailed literature reviewed on kinesio-taping for the management of plantar fasciitis.

Year	Author	Sample size	Intervention	Outcome measures	Key findings
2021	Dedes *et al.* [17]	50	Kinesio taping vs sham taping	VAS, FFI	Significant short-term pain relief
2020	Becerro-de-Bengoa-Vallejo *et al.* [18]	Not specified	Kinesio taping (RCT)	Pain, PF thickness	Significant reduction in pain and thickness
2019	Shakeri *et al.* [32]	Not specified	Kinesio taping	Pain, PF thickness	Reduces pain and fascia thickness
2015	Cheung *et al.* [33]	Not specified	Kinesiology taping (SR)	Pain, Function	Limited to moderate evidence of benefit
2015	Lim *et al.* [34]	Not specified	Kinesio taping (SR & MA)	Pain, Function	Small but significant pain reduction
2010	Tsai *et al.* [19]	Not specified	Kinesio taping	Pain, Function	Short-term pain relief observed
2006	Radford *et al.* [20]	92	Low-Dye taping	Pain, Function	Effective for short-term pain relief

Table 5. Description of detailed literature reviewed on manual therapy for the management of plantar fasciitis.

Year	Author	Sample size	Intervention	Outcome measures	Key findings
2025	Sharma *et al.* [35]	72	ESWT vs PRP	VAS, FFI	PRP showed longer-term benefit
2025	Lee *et al.* [36]	58	Combined physiotherapy protocol	Functional scale	Multimodal therapy superior
2023	Boob *et al.* [5]	80	Exercise therapy vs conventional care	VAS, FFI	Exercise improved pain and mobility
2023	Khammas *et al.* [8]	60	Manual therapy vs control	Ultrasound thickness, VAS	Improved fascia thickness and pain
2023	Raj *et al.* [10]	75	Multimodal physiotherapy	VAS, Functional scores	Combined approach most effective
2021	Narlawar *et al.* [21]	50	Manual therapy vs conventional physiotherapy	AS, ROM, Functional scales	Manual therapy more effective
2019	Grim *et al.* [22]	60	Manual therapy vs orthoses vs combined	Pain (VAS), function (FFI)	Combined therapy most effective
2019	Yelverton *et al.* [23]	45	3 manual therapy approaches	VAS, FFI	All improved; combined best

Year	Author	Sample size	Intervention	Outcome measures	Key findings
2018	Fraser *et al.* [37]	Multiple studies	Manual therapy (various other techniques)	Pain, function (VAS, FFI, etc.)	Improves pain & function; evidence supports use
2018	Pollack *et al.* [38]	Review	Manual therapy	Pain, function	Effective for pain relief & functional improvement
2014	Ajimsha *et al.* [24]	60	Myofascial release	VAS, Foot Function Index (FFI), ROM	Significant pain reduction & improved function

Table 6. Description of detailed literature reviewed on dry needling, ESWT, LLLT and other modalities for the management of plantar fasciitis.

Year	Author	Sample size	Intervention	Outcome measures	Key findings
2024	Cotchett *et al.* [25]	55	Dry needling vs sham	VAS, pain pressure threshold	Significant pain reduction
2024	Singh *et al.* [39]	50	TENS vs UST	VAS	Both effective, TENS better for acute pain
2022	Llurda-Almuzara *et al.* [40]	Not specified	Dry needling (SR & MA)	Pain, function	Effective for pain and function improvement
2022	Kamel *et al.* [41]	48	LLLT vs placebo	VAS	LLLT effective in short-term pain relief
2021	Ughreja *et al.* [42]	Not specified	Dry needling (SR & MA)	Pain, function	Effective for pain reduction
2021	Llurda-Almuzara *et al.* [43]	Not specified	Dry needling (SR & MA)	Pain, function	Effective for pain reduction
2021	Morrissey *et al.* [44]	Not specified	Best practice guide (multimodal care)	Pain, function	Combined approach most effective
2020	Ulusoy *et al.* [26]	54	ESWT vs UST	VAS, AOFAS	ESWT more effective in pain reduction
2016	Eslamian *et al.* [27]	70	ESWT vs corticosteroid injection	VAS, FFI	ESWT safer with sustained effects
2014	Dunning *et al.* [45]	Not specified	Dry needling (review)	Pain, function	Supports use with clinical guidance
2006	DiGiovanni *et al.* [14]	101	PF-specific vs Achilles stretch	VAS, FFI	PF stretch more effective (pain & function), sustained at 2 years

Discussion

The present review critically evaluates the effectiveness of various physiotherapy interventions for PF, including exercise therapy, kinesio taping, manual therapy, and adjunct modalities. Although the overall evidence supports conservative management, several inconsistencies, methodological limitations, and gaps in the literature must be acknowledged.

Stretching and strengthening exercises remain the most consistently recommended interventions; however, the superiority of combined approaches over isolated treatments, as reported in multiple studies [7,16], should be interpreted with caution. Many of these studies lack long-term follow-up or have relatively small sample sizes, limiting the generalizability of their findings. While high-load strength training appears to provide superior long-term outcomes compared to stretching alone [15], adherence to such programs in real-world clinical settings may be challenging, particularly in populations with high pain levels. Furthermore, although PF-specific stretching has been reported to be more effective than calf stretching [14,28], the differences are often modest and may not always translate into clinically meaningful improvements. The role of intrinsic foot muscle strengthening is supported by several studies [29,30], yet the heterogeneity in exercise protocols makes it difficult to establish standardized treatment guidelines. Biomechanical evidence supporting toe dorsiflexion to enhance plantar fascia strain [31] provides a theoretical basis; however, its direct clinical applicability remains insufficiently explored.

Kinesio taping demonstrates consistent short-term pain relief [17,19,20], but its clinical significance is debatable. The observed reductions in plantar fascia thickness [18,32] suggest a physiological effect; however, these changes do not always correlate with long-term functional improvement. Moreover, systematic reviews report only small to moderate benefits [33,34], raising concerns about its cost-effectiveness and clinical relevance as a primary intervention. The

reliance on short-term outcomes in most studies further limits the strength of the evidence, suggesting that kinesio taping should be viewed as a temporary adjunct rather than a definitive treatment.

Manual therapy shows promising results in improving pain and function [23,36–38], yet the evidence is complicated by variability in techniques, treatment duration, and practitioner skill. While multimodal approaches consistently demonstrate superior outcomes [36,21,22], it is difficult to isolate the specific contribution of manual therapy within these combined protocols. Additionally, some studies lack adequate control groups or blinding, introducing potential bias. Myofascial release techniques have shown notable improvements [38], but these findings are often based on small-scale trials. Although recent studies advocate for integrating manual therapy into comprehensive rehabilitation programs [5,8,10,35], the absence of standardized protocols and high-quality randomized controlled trials limits definitive conclusions.

Among adjunct modalities, dry needling has shown effectiveness in reducing pain and improving function [24,39,41,42]; however, much of the supporting evidence comes from systematic reviews that include heterogeneous studies with varying methodological quality. The placebo effect and practitioner-dependent variability may also influence outcomes. Similarly, extracorporeal shockwave therapy (ESWT) appears more effective than ultrasound therapy [44], but differences in treatment parameters and patient selection criteria across studies reduce comparability. Low-level laser therapy (LLLT) demonstrates short-term benefits [40], yet its long-term efficacy remains unclear due to limited follow-up data. While TENS shows advantages in acute pain management [25], its effects are largely symptomatic and do not address underlying biomechanical causes. Importantly, best practice guidelines emphasize multimodal care [43], but the lack of consensus on optimal treatment combinations highlights a significant gap in the literature.

A key limitation across the reviewed studies is the heterogeneity in study design, intervention protocols, outcome measures, and follow-up durations, which complicates direct comparisons and synthesis of findings. Many studies rely heavily on subjective outcome measures such as VAS and functional scales, with limited incorporation of objective biomechanical or imaging-based assessments. Additionally, sample sizes are often small, and long-term data are scarce, particularly for newer interventions such as dry needling and LLLT. Publication bias and the predominance of positive findings further raise concerns regarding the robustness of the evidence.

In conclusion, while the reviewed interventions demonstrate varying degrees of effectiveness in managing plantar fasciitis, the current evidence base is limited by methodological weaknesses and inconsistencies. Although multimodal approaches appear to offer the most benefit, there is insufficient high-quality evidence to establish standardized, evidence-based treatment protocols. Future research should focus on well-designed randomized controlled trials with larger sample sizes, standardized intervention protocols, and long-term follow-up to determine the most effective and clinically meaningful treatment strategies.

Conclusion

This review indicates that physiotherapy interventions are effective in the management of plantar fasciitis; however, no single modality can be considered superior in isolation due to variability in evidence quality and study designs. Combined approaches, particularly those integrating strengthening and stretching exercises, consistently demonstrate better outcomes in pain reduction and functional improvement [7,16]. While high-load strength training and plantar fascia–specific stretching show promising results [15,28,14], their clinical superiority is influenced by patient adherence and protocol variability.

Adjunct interventions such as kinesio taping provide short-term symptomatic relief but have limited long-term clinical impact [17,33,34]. Manual therapy appears beneficial, especially when combined with other treatments, although its independent effects remain difficult to isolate [24,17,18]. Modalities like dry needling, ESWT, and LLLT show supportive evidence for pain reduction [24,40,44], yet their long-term effectiveness and standardization require further investigation.

Overall, a multimodal, individualized treatment approach remains the most appropriate strategy for managing plantar fasciitis [43]. Future research should focus on high-quality, standardized trials with long-term follow-up to establish clearer, evidence-based clinical guidelines.

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Ethical Approval

Not applicable.

Competing Interests

The authors declare no competing interests.

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