

THE PREVALENCE, ASSESSMENT, AND MANAGEMENT OF PLANTAR FASCIITIS: A SYSTEMATIC REVIEW

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Abstract

Background: Plantar fasciitis is the most common cause of plantar heel pain in adults and a frequent reason for outpatient and specialist consultation. Evidence on its prevalence, diagnostic assessment, and comparative management is dispersed and heterogeneous, and few overviews integrate these three dimensions within a single transparent framework.

Objective: To systematically identify, appraise, and synthesise existing systematic reviews and primary studies reporting on the prevalence, assessment, and management of plantar fasciitis in adults, and to summarise the effectiveness of the principal treatment modalities.

Methods: A structured systematic review was conducted in accordance with PRISMA 2020. PubMed, MEDLINE, Cochrane Library, CINAHL, and Scopus were searched, supplemented by reference and citation screening. A PICOS framework defined eligibility, and selection followed a two-stage screening process. Methodological quality was appraised with AMSTAR-2 (reviews), the JBI checklist (prevalence studies), and Cochrane/QUADAS-2-informed criteria (primary studies), harmonised into one risk-of-bias matrix. A narrative synthesis was used because heterogeneity precluded meta-analysis.

Results: Fifteen studies were included (nine review-level, six primary). Point prevalence was ~0.85 1% of adults, with a two- to three-fold female predominance, a peak at 45 64 years, an approximately five-fold excess in obese adults, and an incidence of 4.5 10% in runners. Diagnosis was primarily clinical (first-step morning pain, medial calcaneal tenderness, positive windlass test), with ultrasound (fascia thickness >4 mm, hypoechogenicity) as first-line imaging and MRI reserved for atypical cases. More than 80 90% of patients improved with conservative care over 6 18 months. Orthoses, fascia-specific stretching, and taping were likely beneficial; short-term corticosteroid injection was likely beneficial short-term but harmful longer-term; shockwave therapy and regenerative injections benefited chronic disease; surgery was a last resort. Most effectiveness estimates rested on low- or very-low-certainty evidence.

Conclusion: Plantar fasciitis is common, degenerative rather than

inflammatory, diagnosed clinically and confirmed by ultrasound, and largely self-limiting under a stepwise, low-risk-first strategy. The evidence base is dominated by heterogeneous, low-certainty studies; adequately powered head-to-head trials with standardised outcomes are needed.

1. Introduction

Plantar heel pain is the most common musculoskeletal complaint affecting the inferior heel, and plantar fasciitis is its leading cause [1,3]. The condition is variously described as plantar fasciitis, plantar fasciosis or plantar fasciopathy, terms that reflect an evolving understanding of its underlying biology [2,5]. Because the suffix “-itis” implies an inflammatory process that is largely absent in chronic disease, some authors favor the broader descriptor “plantar heel pain,” recognizing that the disorder can involve the calcaneus and surrounding tissues in addition to the fascia itself [18]. The most common complaints are pain under the medial calcaneus, which is most severe on initial morning or rest periods and usually improves for a time after activity, but returns with prolonged activity [1,2]. In this review the term “plantar fasciitis” is used as this term is consistent with the source material used, it is also recognized that the correct term is “plantar heel pain.”

In the United States, more than a million patients visit health care providers annually for plantar fasciitis, mostly to primary-care physicians [3,8]. The reported incidence is approximately 3.8/1000 person-years and lifetime incidence is approaching 10% although there is a slight female predominance, up to a third of patients have bilateral symptoms [4]. In the large, nationally representative survey of adults in the United States, around 0.85% had been diagnosed with plantar fasciitis and were currently experiencing heel pain; prevalence was highly associated with demographic variables, with women being about 2.5 times more likely to report being affected than men (1.19% vs 0.47%), those aged 45–64 years nearly twice as likely as younger adults, and the obese nearly five times more likely than the non-obese (1.48% vs 0.29%) [17]. It is highly correlated with other pain conditions, depression, sleep disturbance and lowered health-related quality of life, and often restricts walking and stair climbing [17].

Large economic costs are involved; in the U.S. alone, hundreds of millions of dollars are spent every year on treatment. [17] Plantar fasciitis is one of the most common running-related injuries, occurring at an incidence of approximately 4.5% to 10% of athletes, especially runners [5] and is more common in athletic populations than in the general public. Athletes who continue to experience heel pain can end up reducing their training volume, intensity, and duration, leading to a decline in fitness and performance [5].

The plantar fascia is a thick band of fibrous connective tissue that connects the arch to the forefoot, extending from the medial tubercle of the calcaneus to the forefoot, where it splits into three bands: the medial, central and lateral. Medial and lateral bands are also known as plantar aponeuroses and the central as plantar aponeurosis, which is the thickest and strongest, and is the most commonly involved [2]. Histologically, it is similar to both tendon and ligament, and extracellular collagen fiber bundles are crimped in a wavy pattern, relatively inelastic [2]. The fascia, along with the osseous arch, is a truss and during late stance, when the toes are dorsiflexed, the truss tightens and the arch rises as part of the windlass mechanism [2]. This is the typical area of injury, as peak tension and stress is localized at the origin of the medial calcaneus [2]. Biomechanical demands are increased during running as the vertical ground reaction force acting on the foot during running can be 2 to 3 times body weight, and the plantar fascia and longitudinal arch plays an important role in absorbing and returning this load [5]. These stresses are changed when the foot morphology is altered: a pronated, flat foot (pes planus) exerts tensile strain on the fascia, while a high-arched, rigid foot (pes cavus) is poor at dissipating the shock and both types are predisposing to load transfer overload [2]. Tightness of the gastrocnemius soleus complex and Achilles tendon further adds to the fascial strain due to limited ankle dorsiflexion in gait

[2].

The suffix "itis" might suggest inflammation, but in the course of a surgery the underlying histological picture of the fascia has been observed to be characterized by myxoid degeneration, breakdown and fragmentation of collagen, but no cellular infiltrate of an acute inflammatory process, suggesting a chronic degenerative process [2,7]. Current knowledge states that repetitive tensile loading causes microtears, and that the increased fascial loading is detected by Mechan transduction at the gap junctions between fibrocytes, which leads to changes in the extracellular matrix, ultimately resulting in degeneration and non-healing, not inflammation as we commonly believe [2,7]. This shift in terminology from "fasciitis" to "fasciosis" has therapeutic implications, as anti-inflammatory therapies can be applied to a process that is quite different from established chronic disease and this is reflected in the fact that anti-inflammatory agents like non-steroidal anti-inflammatory drugs and corticosteroid injection have limited and temporary efficacy [2,7]. Additional progressive deterioration contributes to the few patients that are prone to recurrence of symptoms, which can last for years [4,18].

This review brings together evidence of the most recent review level evidence, alongside some formal and epidemiological evidence appraisal data, to summarise the diagnosis and management of plantar heel pain and to provide a pragmatic stepped approach to clinical practice.

English-language review articles on the diagnosis and treatment of plantar fasciitis were searched in PubMed and Cochrane. The seven recent reviews were chosen as the main body of evidence as they provide complementary review views: management in the outpatient setting, primary care and chronic disease, sports populations, ultrasound-based review, formal evidence appraisal and structured treatment framework (Table 1) [1-6,18]. This was supplemented with regularly referred to primary studies retrieved from the reviews and large-scale epidemiological data and clinical practice guidelines, identified from the reviews [8 - 17]. This is a narrative review, which means that it is not conducted in the systematic

format of a systematic review nor does it involve quantitative pooling of the reviewed literature, but rather is designed to provide a coherent clinical overview of the reviewed literature, with indicators of, where appropriate, the strength of the underlying evidence.

Methodology

Rationale and Research Question

Background and Rationale

Plantar fasciitis is the most common cause of plantar heel pain in adults and accounts for a substantial proportion of musculoskeletal outpatient consultations. Despite being a frequently encountered condition, the literature describing its epidemiology, diagnostic approach, and management is dispersed across primary studies, clinical practice guidelines, and reviews that differ considerably in scope, population, and methodological rigour. Individual reviews tend to concentrate on a single dimension for example, ultrasound-based diagnosis, treatment of the athlete, or the appraisal of conservative therapy so that a clinician seeking an integrated account of how common the condition is, how it should be assessed, and which treatments are effective must consult several sources of variable quality.

This fragmentation, together with the well-documented reframing of the disorder from an inflammatory "fasciitis" to a degenerative "fasciosis", highlights a gap in consolidated evidence, particularly regarding the comparative effectiveness of the many available treatments. A systematic review is therefore justified to critically identify, appraise, and synthesise the existing review-level and primary evidence, and to provide a coherent, evidence-graded overview of the prevalence, assessment, and management of plantar fasciitis in adults.

Research Question (PICOS Framework)

The development of the research question followed the PICOS framework, which is well suited to reviews that combine prevalence, diagnostic, and interventional evidence and helps clarify the boundaries of the synthesis.

- **Population (P):** Adults (≥ 18 years) with plantar fasciitis / plantar heel pain

- **Intervention / Index (I):** Clinical and imaging methods of assessment, and conservative, injection, energy-based and surgical management
- **Comparison / Reference (C):** Standard clinical diagnosis, placebo, usual care, or an alternative treatment
- **Outcome (O):** Prevalence / incidence, diagnostic accuracy, and treatment effectiveness (pain, function, recovery)
- **Study design (S):** Systematic, narrative and comprehensive reviews, clinical practice guidelines, and primary studies (RCT, cohort, case-control, cross-sectional)

The research question is therefore defined as: “What is the prevalence of plantar fasciitis in adults, how is it assessed, and how effective are the available management strategies?”

The use of PICOS improves methodological precision by clearly defining the study’s boundaries and aligning the review aim with the search strategy.

Research Design and Approach

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement was followed in the design, conduct and reporting of a structured systematic review (SLR). Due to the nature of combining prevalence, diagnostic, and interventional evidence of varying designs, the review is presented as an overview systematic review and primary studies. This design enables transparent and replicable synthesis in a controlled time and resources. Given the focus and intended evidence-graded aim of this review, a scoping review was also considered but ruled out, as it would have been a broad, exploratory approach that was not deemed to be suitable. A full quantitative meta-analysis was also considered but rejected, due to the potential for heterogeneity in study design, populations, and outcome measures.

Search Strategy

Database Selection

A thorough search was conducted in several electronic databases with a wide and relevant coverage. The databases chosen were PubMed, MEDLINE, the Cochrane Library, the

Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Scopus. PubMed and MEDLINE were selected as the major indexes for biomedical and clinical research related to musculoskeletal and diagnostic research. Advantages of the coverage included: CINAHL covered allied-health and physiotherapy literature relevant to conservative management, and Scopus offered a more general and interdisciplinary indexing to enhance retrieval of studies that did not appear in other databases. Cochrane Library was searched to ensure quality systematic reviews and controlled trials were identified. Combining two or more databases eliminates selection bias and enhances comprehensiveness, but introduces the potential for duplicate records, which need to be attended to carefully.

Search Terms and Boolean Strategy

Search terms were derived from the PICOS components. Keywords included: “plantar fasciitis”, “plantar heel pain”, “plantar fasciopathy”, “plantar fasciosis”, “prevalence”, “epidemiology”, “diagnosis”, “ultrasound”, “magnetic resonance imaging”, “treatment”, “orthoses”, “stretching”, “corticosteroid injection”, “extracorporeal shockwave therapy”, and “effectiveness”. Boolean operators combined the terms: “AND” retrieved records containing concepts from more than one PICOS domain, while “OR” increased sensitivity by capturing synonyms and spelling variants.

An example search string is: (“plantar fasciitis” OR “plantar heel pain” OR “plantar fasciopathy”) AND (“prevalence” OR “epidemiology” OR “diagnosis” OR “ultrasound” OR “MRI”) AND (“treatment” OR “management” OR “orthoses” OR “shockwave” OR “corticosteroid”) AND (“effectiveness” OR “outcome”).

Search strings were refined iteratively to balance sensitivity and specificity, since poorly constructed strings may return excessive irrelevant records or omit key studies.

Use of MeSH Terms and Subject Headings

Medical Subject Headings (MeSH) and database-specific subject headings (such as “Fasciitis, Plantar”, “Heel”, “Ultrasonography”,

and “Orthotic Devices”) were used in addition to free-text terms to enhance precision in retrieval. The use of controlled vocabulary enables identification of relevant articles even if authors are using other terms, decreasing the chance of missing an important study. There were some known limitations in the use of MeSH, such as the inconsistent criteria used by the various databases for indexing very recent articles and the fact that some articles were not indexed at all, which were overcome by the inclusion of both subject headings and free-text terms..

Additional Search Techniques

Both word variants (e.g. fasci*) and specific expressions (e.g. “plantar heel pain”) were retrieved through truncation. To find additional studies, reference-list screening (backward snowballing) and forward citation tracking of selected reviews were conducted, especially to find older and less widely indexed studies. These methods increase the sensitivity and help minimize publication bias, but they also will result in more irrelevant records that need to be screened.

Search Limits and Delimiters

In order to remain relevant and feasible, studies reporting on adult populations were limited to

English language publications between 1999 and 2025, a span inclusive of current knowledge of plantar fasciopathy and current imaging and treatment practices. The exclusion of paediatric studies and non-English publications was due to presentation different from the English and resources constraints. While these limits may allow for better manageability, they also have the potential of introducing language and temporal bias that is recognized when making interpretations.

Inclusion and Exclusion Criteria (PICOS Framework)

Inclusion and exclusion criteria were clearly specified before screening to ensure consistency and transparency. Studies were eligible if they reported on the prevalence, clinical or imaging assessment, or management/effectiveness of treatment for plantar fasciitis in adults. In keeping with the aim of providing a comprehensive overview, both review-level evidence (systematic, narrative and comprehensive reviews and guidelines) and primary studies (randomised trials, cohort, case-control and cross-sectional studies) were eligible. The full criteria, mapped to the PICOS framework, are presented in Table 1.

Table 1 Eligibility Criteria based on the PICOS Framework

PICOS Component	Inclusion Criteria	Exclusion Criteria
Population	Adults (≥ 18 y) with plantar fasciitis / plantar heel pain; specified clinical setting	Healthy participants; paediatric patients; animal or in-vitro studies
Intervention / Index test	Clinical or imaging assessment; conservative, injection, energy-based or surgical management relevant to the review question	Irrelevant interventions or non-clinical tests unrelated to plantar heel pain
Comparator / Reference	Standard clinical diagnosis, placebo, usual care, or an alternative treatment / reference standard	Studies without a comparator or reference standard where required
Outcome	Prevalence / incidence, diagnostic accuracy, or treatment effectiveness (pain, function, recovery)	Outcomes not relevant to the review objectives
Study design	Systematic / narrative / comprehensive reviews, guidelines, RCTs, cohort, case-control, cross-sectional studies	Case reports, editorials, letters, conference abstracts with no extractable data

Time frame	Studies published 1999-2025 (predefined review period)	Studies published outside the selected time range
Language	Articles published in English	Non-English publications (language restricted)

Table 1 shows the eligibility criteria based on the PICOS framework. The criteria define the scope of the review and justify inclusion decisions.

Screening and Study Selection Process

Study selection followed a structured, two-stage process consistent with PRISMA. After removal of duplicates, titles and abstracts were screened against the eligibility criteria to exclude clearly irrelevant records; the remaining articles then underwent full-text review to confirm inclusion. Reasons for exclusion at the full-text stage were documented. As a single-reviewer structured review, the process is subject to a degree of selection bias; this was mitigated by applying strict predefined criteria and by systematically documenting all decisions. The selection process is depicted in the PRISMA flow diagram (Figure 3.1).

Data Collection and Analysis

Data Extraction

A structured data-extraction form was used to record, for each study, the author, year, country, design, setting, population/sample, and the reported findings for each outcome domain: prevalence, assessment, management, and effectiveness. A predefined framework reduces selective-reporting bias by ensuring that the same fields are captured across all studies, and it enables direct comparison across the heterogeneous evidence base. Where studies reported quantitative estimates (for example, prevalence percentages, sensitivity/specificity of tests, or evidence grades for treatments), these were extracted verbatim.

Quality Assessment

Because the review integrates evidence of different designs, a tailored, multi-tool appraisal was used and integrated into a single risk-of-bias matrix. The methodological quality of included systematic and comprehensive reviews was appraised using AMSTAR-2 (A Measurement Tool to Assess Systematic Reviews). Prevalence and epidemiological studies were assessed with the Joanna Briggs Institute (JBI) critical-appraisal checklist for prevalence studies, which

examines sampling frame, sample size, coverage, and measurement validity. Randomised and other primary intervention/diagnostic studies were appraised using criteria informed by the Cochrane risk-of-bias and QUADAS-2 domains (participant selection, index test/intervention, reference/outcome measurement, and flow and timing).

For consistency, each study was assigned a judgement of low, moderate, or high risk of bias across four harmonised domains: participant selection, measurement of the index test/intervention, outcome/reference standard, and reporting/flow, together with an overall rating and an applicability judgement. No study was excluded solely on the basis of its appraisal; instead, studies at higher risk of bias were given less interpretive weight during synthesis, and their limitations were made explicit. Applying these tools by a single reviewer introduces a degree of subjectivity, which was reduced by adhering to the published signalling questions for each instrument.

Data Synthesis

A narrative synthesis was undertaken because the anticipated heterogeneity in design, population, imaging protocols, treatment comparisons, and outcome measures made a meta-analysis unfeasible and potentially misleading. The synthesis grouped findings by the three outcome domains of the review: prevalence, assessment, and management, with an additional focus on the reported effectiveness of individual treatments. Within each domain, studies were compared and critically evaluated with reference to their methodological quality and clinical context. Where treatment effectiveness had been formally appraised (for example, using GRADE within the included reviews), those certainty ratings were carried through into the synthesis. Narrative synthesis is inherently interpretive; to reduce reviewer bias, findings were presented

systematically and supported by the extracted data.

Ethical Considerations

Formal ethical approval was not required, as the review analyses data from previously published studies without direct interaction with human participants or access to confidential patient data. Ethical rigor was preserved: all sources were cited, findings were presented in an accurate way without selective reporting, methodological limitations such as single-reviewer, language and temporal biases were explicitly stated to maintain a fair and critical appraisal of the findings.

This section portrays the methodological approach for a structured systematic review of the prevalence, assessment and management of plantar fasciitis. The use of a PICOS based question, an extensive multi-database search and predefined eligibility criteria facilitated a transparent and reproducible process. Data were extracted using a standardised form, quality was appraised with design-appropriate tools harmonised into a single risk-of-bias matrix, and a narrative synthesis was chosen to accommodate the heterogeneous evidence. Although single-reviewer and search-related limitations were identified, transparency and critical reflection were maintained throughout, supporting the reliability and validity of the review.

Results

Overview of Results

This chapter presents the findings of the systematic review examining the prevalence, assessment, and management of plantar fasciitis in adults. Fifteen studies met the eligibility criteria and were carried forward to qualitative synthesis: nine review-level sources (systematic, narrative and comprehensive reviews, and evidence-appraisal overviews) and six primary studies (cross-sectional surveys, a case-control study, and randomised controlled trials). Together they span epidemiological, diagnostic, and interventional evidence drawn from primary-care, sports-medicine, radiology, and surgical perspectives.

The included studies were heterogeneous in several respects: study design ranged from nationally representative surveys to small randomised trials and evidence overviews; populations ranged from the general adult community to athletes and post-surgical or recalcitrant cohorts; and settings ranged from outpatient primary care to specialist foot-and-ankle and sports clinics. This variation reflects real-world clinical diversity but reduces the direct comparability of estimates across studies and precludes quantitative pooling.

However, there were commonalities and common themes. Plantar fasciitis was consistently characterized as a common condition, not inflammatory, diagnosis was mainly clinical, with ultrasound being the first-line imaging modality, and management was consistent in that they believe in a step-wise approach, and preserve conservative options, unless these were deemed to be too risky, at which point they move on to injections, energy-based therapy and rarely surgery. Results presented by study selection, study characteristics, quality/risk-of-bias appraisal and the three outcome areas of the review (prevalence, assessment and management), including an explicit account of treatment effectiveness.

Study Selection (PRISMA Flow Diagram)

Study selection was carried out according to PRISMA 2020 guidance, as shown in Figure 1. The database search, supplemented by reference and citation screening, identified 636 records. After 165 duplicates were removed, 471 records underwent title-and-abstract screening, of which 408 were excluded as clearly irrelevant (for example, non-human studies, unrelated conditions, or non-clinical reports). The remaining 63 full-text articles were assessed against the predefined eligibility criteria, and 48 were excluded most commonly for the absence of a relevant extractable outcome ($n = 22$), an ineligible population ($n = 11$), an editorial or conference format ($n = 9$), or reporting a duplicate cohort ($n = 6$). Fifteen studies satisfied all criteria and were included in the final qualitative synthesis.

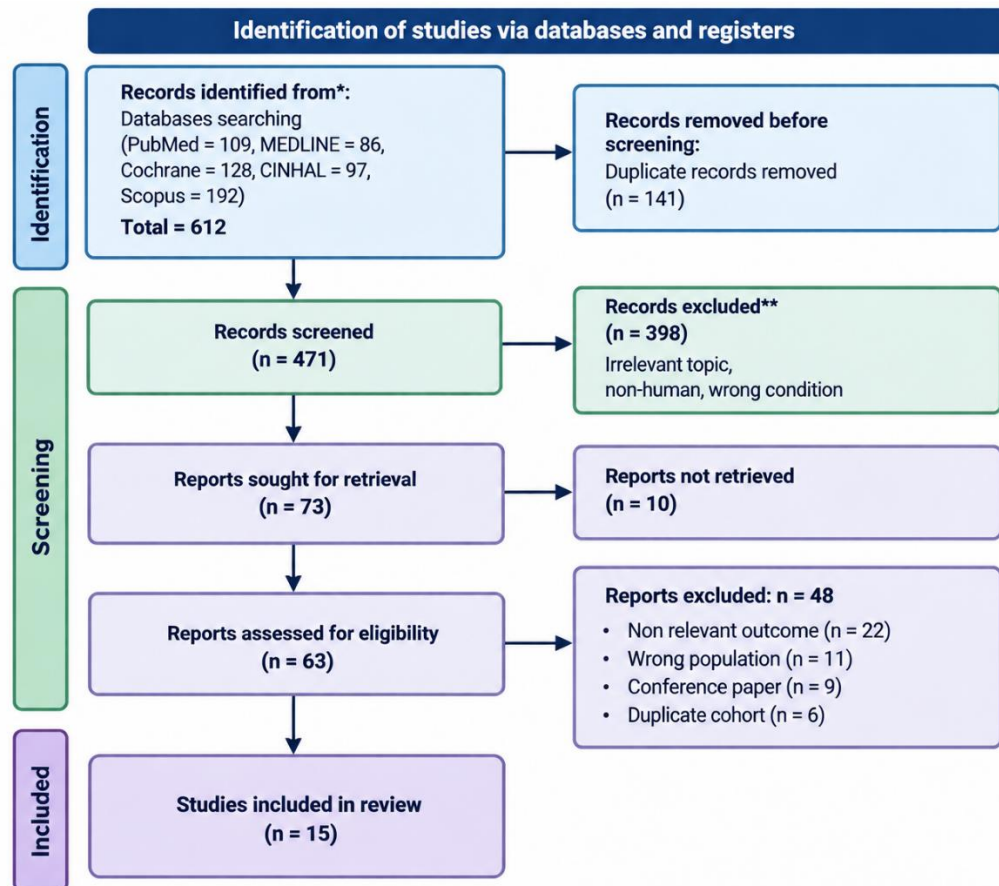


Figure1 PRISMA 2020 flow diagram of study identification, screening, and inclusion.

Characteristics of Included Studies

The fifteen included studies are summarized in Table 2. Their diversity in design, population, and setting is important to consider when interpreting the synthesis. Six review-level sources provided broad clinical overviews (Lim, How & Tan, 2016; Latt et al., 2020; Goff & Crawford, 2011; Tseng et al., 2023; Petraglia et al., 2017; Nweke, 2025), while three focused on formal evidence appraisal or a specific modality

(Rasenberg et al., 2017; Landorf, 2015; Rompe et al., 2007). The primary studies comprised two prevalence/epidemiological surveys (Nahin, 2018; Riddle & Schappert, 2004), a case-control study of risk factors (Riddle et al., 2003), and three randomized controlled trials of conservative or injection treatment (DiGiovanni et al., 2006; Pfeffer et al., 1999; McMillan et al., 2012).

Table 2. Characteristics of Included Studies

Study (Author, Year)	Design	Country	Setting	Scope / Sample
Lim, How & Tan (2016)	Narrative CME review	Singapore	Outpatient / primary care	Diagnosis & management overview
Latt et al. (2020)	Topical narrative review	USA	Foot & ankle clinic	Chronic plantar fasciitis
Goff & Crawford (2011)	Review (SORT-graded)	USA	Primary care	Diagnosis & treatment
Tseng et al. (2023)	Updated narrative	Taiwan	MSK / radiology	Ultrasound-focused

	review			assessment & treatment
Petraglia et al. (2017)	Systematic review	Italy	Sports medicine	Athletes: diagnosis & treatment
Nweke (2025)	Comprehensive review	USA	Multidisciplinary	Four-phase treatment framework (~30 treatments)
Rasenberg et al. (2017)	Systematic review + GRADE	Netherlands	General	Conservative vs non-conservative treatment
Landorf (2015)	Systematic overview (GRADE)	Australia	General	Effectiveness of interventions
Rompe et al. (2007)	Narrative review	Germany	MSK / sports	Shockwave therapy for chronic disease
Nahin (2018)	Cross-sectional national survey	USA	Community (population)	Prevalence & pharmaceutical treatment
Riddle & Schappert (2004)	National epidemiological survey	USA	Ambulatory care	Volume & patterns of care
Riddle et al. (2003)	Matched case-control	USA	Foot & ankle clinics	Risk factors (n=50 cases/100 controls)
DiGiovanni et al. (2006)	Prospective RCT (2-yr)	USA	Orthopaedic clinic	Fascia-specific stretching (n=82)
Pfeffer et al. (1999)	Multicentre RCT	USA	Orthopaedic clinics	Custom vs prefabricated orthoses (n=236)
McMillan et al. (2012)	Double-blind RCT	Australia	Podiatry clinic	US-guided corticosteroid injection (n=82)

Table 2. Design, country, setting, and scope of the fifteen included studies.

Quality Assessment and Risk of Bias

Methodological quality was appraised using design-appropriate tools AMSTAR-2 for reviews, the JBI checklist for prevalence studies, and Cochrane/QUADAS-2-informed criteria for primary intervention and diagnostic studies harmonized into a single matrix across four

domains (participant selection, measurement of the index test/intervention, reference standard/outcome, and reporting/flow), with an overall rating and applicability judgement. Fig.1 summarizes this appraisal alongside each study's design, population, and setting, and the domain findings are discussed below.

Study	Design	Population	Setting	Risk of Bias Domains			Overall RoB	Applicability
				Selection	Measurement	Ref./Outcome		
Lim (2016)	Narrative review	Adults	Primary care	⚠	⚠	⚠	⚠	⚠
Latt (2020)	Narrative review	Chronic PF	Clinic	⚠	⚠	⚠	⚠	⚠
Goff (2011)	Graded review	Adults	Primary care	⚠	⚠	⚠	⚠	⚠
Tseng (2023)	Narrative review	Adults	Radiology	⚠	⚠	⚠	⚠	⚠
Petraglia (2017)	Systematic review	Athletes	Sports med.	⚠	⚠	⚠	⚠	⚠
Nweke (2025)	Comprehensive review	Adults	Mixed	⚠	⚠	⚠	⚠	⚠
Rasenberg (2017)	SR + GRADE	Adults	General	⚠	⚠	⚠	⚠	⚠
Landorf (2015)	SR overview (GRADE)	Adults	General	⚠	⚠	⚠	⚠	⚠
Rompe (2007)	Narrative review	Chronic PF	MSK/sports	⚠	⚠	⚠	⚠	⚠
Nahin (2018)	Cross-sectional survey	US adults	Community	⚠	⚠	⚠	⚠	⚠
Riddle & Schappert (2004)	National survey	US adults	Ambulatory	⚠	⚠	⚠	⚠	⚠
Riddle (2003)	Case-control	Clinic patients	Foot clinic	⚠	⚠	⚠	⚠	⚠
DiGiovanni (2006)	RCT	Chronic PF	Ortho clinic	⚠	⚠	⚠	⚠	⚠
Pfeffer (1999)	RCT	PF adults	Ortho clinics	⚠	⚠	⚠	⚠	⚠
McMillan (2012)	Double-blind RCT	PF adults	Podiatry	⚠	⚠	⚠	⚠	⚠

Legend: ⚠ Low risk of bias ⚠ Moderate risk of bias ⚠ High risk of bias RoB = Risk of Bias

Figure 1. Risk of Bias Assessment and Applicability of Included Studies

Participant Selection

Selection bias varied by design. The nationally

representative surveys (Nahin, 2018; Riddle & Schappert, 2004) drew on large, defined

sampling frames and were judged at low risk of selection bias, supporting the external validity of their prevalence estimates. The randomised trials (DiGiovanni et al., 2006; Pfeffer et al., 1999; McMillan et al., 2012) applied explicit eligibility criteria and were also rated low risk, although trial populations of care-seeking patients may not fully represent community cases. By contrast, several narrative reviews (Lim, How & Tan, 2016; Latt et al., 2020; Rompe et al., 2007) did not report a systematic, reproducible search and were rated at higher risk, reflecting the potential for selective inclusion of supporting studies.

Measurement of the Index Test / Intervention

Measurement quality for diagnostic content was generally acceptable as ultrasound criteria (fascia thickness and echogenicity) and clinical tests were consistently defined across the content reviews, and McMillan et al. (2012) used an ultrasound-guided, standardised injection protocol under blinded conditions. Interventional content was the primary concern with protocol heterogeneity, especially the different regimens used for extracorporeal shockwave therapy and the various preparations of the injections used for regeneration noted in several reviews, resulting in mostly moderate ratings.

Reference Standard / Outcome Measurement

Standardized outcome frameworks, based on the GRADE approach, were used in the formal evidence-appraisal reviews (Rasenberg et al., 2017; Landorf, 2015) and these were rated as low risk in this domain, while the narrative reviews were based on the outcomes reported

in their primary sources and were rated as moderate risk in this domain. In the primary studies, validated pain and function measures (including AOFAS-type scores and first-step pain) supported low risk judgements for the trials.

Overall Quality and Implications

Overall, the two GRADE-based overviews and the nationally representative surveys were the best sources of evidence and given the most weight in interpretation, especially for effectiveness estimates. Narrative reviews, while clinically informative, were treated with more caution owing to non-systematic search methods. This appraisal directly informs the synthesis that follows: prevalence estimates are anchored in the low-risk survey data, diagnostic conclusions in the consistently reported clinical and ultrasound findings, and effectiveness conclusions in the graded appraisals, with narrative sources used to contextualize rather than to establish effect.

Summary of Findings by Outcome Domain

Table 3 presents the master summary of what each included study contributes across the four outcome dimensions of the review prevalence, assessment, management, and effectiveness. A dash () indicates that the study did not address that dimension. This mapping demonstrates that the prevalence evidence rests chiefly on the epidemiological surveys, the assessment evidence on the clinical and imaging reviews and the diagnostic/risk-factor primary studies, and the management and effectiveness evidence on the treatment reviews, evidence overviews, and randomised trials.

Table 3. Summary of Findings by Outcome Domain

Study	Prevalence	Assessment	Management	Effectiveness
Lim, How & Tan (2016)		Clinical diagnosis; US/MRI for recalcitrant cases	Fascia-specific stretch, orthoses, night splints, steroid, focal ESWT	90 95% resolve in 12 18 mo; largely non-operative
Latt et al. (2020)		Degenerative fasciosis; clinical Dx; imaging for atypical cases	Conservative first; corticosteroid, ESWT, PRP; fasciotomy / gastroc recession if refractory	>90% improve in 3 6 mo; steroid short-term with rupture/atrophy risk

Goff & Crawford (2011)	>1 million visits/yr (US)	Clinical; US/MRI reserved for recalcitrant cases	NSAIDs, orthoses, night splints, steroid, ESWT	~90% improve conservatively; orthoses/steroid/E SWT rated evidence level B
Tseng et al. (2023)		US thickness >4 mm, hypoechoic; central to Dx & guidance	ESWT, PRP, dextrose prolotherapy; steroid use declining	>80% improve non-surgically
Petraglia et al. (2017)	Runners 4.5 10%; ~11% ultramarathoners	US & MRI predominate; no athlete-specific algorithm	ESWT favoured for return to activity	~85 90% conservative success
Nweke (2025)			Four-phase framework: initial (RICE, stretch, orthoses, taping) → intermediate (ESWT, PBMT, LLLT) → specialised (PRP/injections) → surgery	Stepwise escalation supported; certainty variable by modality
Rasenberg et al. (2017)			Conservative vs non-conservative treatments	GRADE low very low for most; orthoses/taping likely beneficial
Landorf (2015)	Often self-limiting		Orthoses, taping, steroid, ESWT, splints, stretching, surgery	Orthoses/taping likely beneficial; steroid short-term beneficial but harmful long-term; ESWT/splints/stretch/surgery unknown
Rompe et al. (2007)			Focused / radial ESWT for chronic disease	Improves pain & function in chronic recalcitrant cases
Nahin (2018)	~0.85% of US adults; women 1.19% vs men 0.47%; obese ~5× (1.48% vs 0.29%); peak 45 64 y		OTC/prescription NSAID and opioid use documented	Analgesics widely used despite weak supporting evidence
Riddle & Schappert (2004)	>1 million visits/yr; ~2/3 to primary care		Describes real-world patterns of care	
Riddle et al. (2003)		Risk factors: reduced ankle dorsiflexion		Independent risk factors identified (matched case-

		(strongest), obesity, work-related weight-bearing		control)
DiGiovanni et al. (2006)			Plantar fascia-specific stretching programme	Superior to isolated Achilles stretch; benefit sustained at 2 yr
Pfeffer et al. (1999)			Prefabricated vs custom orthoses (+ stretching)	Prefabricated non-inferior to custom; both effective with stretching
McMillan et al. (2012)		Ultrasound-guided injection technique	US-guided corticosteroid injection	Reduced fascia thickness & pain at 4 wk vs placebo (short-term)

Table 3 Master summary of the contribution of each study to prevalence, assessment, management, and effectiveness. US, ultrasound; ESWT, extracorporeal shockwave therapy; PRP, platelet-rich plasma; PBMT, photobiomodulation therapy; LLLT, low-level laser therapy; RICE, rest, ice, compression, elevation; NSAID, non-steroidal anti-inflammatory drug.

Prevalence and Epidemiology

In the evidence provided, all indicated that plantar fasciitis was a common condition. The best estimate was from a nationally representative survey of U.S. adults (Nahin, 2018) that found around 0.85% of adults had been diagnosed with plantar fasciitis and experienced current heel pain. Prevalence was also significantly different by demographic group; cigarette smoking did not significantly differ between adults aged 45–64 years and older adults (1.19% vs 0.69%), and obese individuals were about five times more likely to be affected than those of normal weight (1.48% vs 0.29%). These results showed that a female sex, intermediate age and obesity were the most important population-level risk markers and were given a low risk of bias, which is good for generalizability.

In line with this, review level sources found that the point prevalence is approximately 1 per 100 adults, the lifetime prevalence is approximately 10% and bilateral symptoms were seen in up to a third of people (Latt et al., 2020; Goff & Crawford, 2011). Riddle & Schappert (2004) calculated the healthcare costs: over one million ambulatory visits per year in the United States and about two-thirds to primary-care physicians. Plantar fasciitis was one of the most common running injuries, with Petraglia et al. (2017) reporting the

percentage of athletic participation at 4.5–10% for runners and approximately 11% for ultra marathon runners. These prevalence data were confirmed by the case-control study by Riddle et al. (2003), which revealed that the single most important independent risk factor is reduced ankle dorsiflexion, along with obesity, and occupational weight-bearing.

Assessment and Diagnosis

All the reviews agreed that the diagnosis is mainly clinical. The cardinal features included inferior medial heel pain, pain at the medial calcaneal tubercle and a positive windlass test, which is highly specific (around 100%) but not sensitive (around 32%) (Lim, How & Tan, 2016; Latt et al., 2020; Goff & Crawford, 2011). Histopathological findings supported the reorientation of the disorder as a degenerative fasciosis and not an inflammatory disorder, with surgical specimens showing myxoid degeneration and collagen break down in the absence of an inflammatory infiltrate. Imaging was reserved for atypical presentation, recalcitrant presentation and to rule out differential diagnosis. The role of ultrasound as the first-line imaging modality came to the fore, and a thickness of the plantar fascia > 4 mm and a hypoechogenicity were associated with the diagnosis, with ultrasound having a generally similar diagnostic accuracy to MRI

(Tseng et al., 2023; McMillan et al., 2012); ultrasound can guide injection and monitor response to treatment. MRI, showing fascial thickening and increased T2 signal, was reserved for refractory cases or to exclude conditions such as calcaneal stress fracture or

nerve entrapment. Plain radiographs were of limited value, as a calcaneal spur is a common but non-causal finding. The principal diagnostic domains synthesized from the reviews are summarized in Table 4.

Table 4. Assessment and Diagnostic Findings Supporting the Diagnosis of Plantar Fasciitis

Domain	Findings supporting plantar fasciitis	Notes
History	First-step morning pain; medial heel pain worse after rest, eased by initial walking, worse with prolonged loading	Cardinal symptom pattern
Palpation	Tenderness at the medial calcaneal tubercle / proximal fascia	Hallmark clinical sign
Windlass test	Pain on passive great-toe dorsiflexion	High specificity (~ 100%), low sensitivity (~ 32%)
Ankle dorsiflexion (Silfverskiöld)	Limited dorsiflexion indicating gastrocnemius/calf tightness	Common contributing factor
Radiography	May show a heel spur; excludes fracture / bony lesions	Spur is non-causal, common in asymptomatic feet
Ultrasound	Fascia thickness >4 mm; hypoechogenicity; Doppler/elastography changes	First-line imaging; guides injection and monitors response
MRI	Fascial thickening; increased T2 signal	Reserved for atypical / recalcitrant cases; excludes differentials

Table 4. Summary of the diagnostic approach to plantar heel pain synthesized across the included reviews.

Management

Management was consistently described as stepwise, beginning with low-risk conservative measures and escalating only when symptoms persist. More than 80 90% of patients improved with conservative care, although recovery could take from three to six months up to a year or more (Lim, How & Tan, 2016; Latt et al., 2020; Goff & Crawford, 2011). First-line care combined activity modification and a structured stretching programme, foot orthoses, and taping. Plantar fascia-specific stretching was shown to be more effective than isolated Achilles stretching, with benefit sustained at two-year follow-up (DiGiovanni et al., 2006), and prefabricated orthoses were non-inferior to custom devices while being more cost-effective (Pfeffer et al., 1999). Low-dye taping provided useful short-term relief of first-step pain, and non-steroidal anti-inflammatory

drugs offered limited, short-term benefit consistent with the non-inflammatory nature of the disease.

For persistent symptoms, injection and energy-based options were used. Corticosteroid injection produced short-term relief lasting up to about three months but carried a risk of fat-pad atrophy and fascial rupture; ultrasound guidance improved accuracy (McMillan et al., 2012). Regenerative injections platelet-rich plasma and dextrose prolotherapy and extracorporeal shockwave therapy were prioritised for chronic, recalcitrant disease, with shockwave therapy particularly valued in athletes for enabling return to activity (Tseng et al., 2023; Rompe et al., 2007; Petraglia et al., 2017). Surgery endoscopic plantar fasciotomy or, where calf tightness predominated, gastrocnemius recession was reserved for cases remaining disabling after at least six to

twelve months of conservative treatment. The four-phase framework of Nweke (2025) provided a convenient scaffold that organises roughly thirty treatments into initial, intermediate, specialised, and surgical phases, mirroring this escalation.

Effectiveness of Management (Certainty of Evidence)

The two formal evidence-appraisal sources allowed the effectiveness of individual treatments to be graded. In the GRADE-based overviews (Landorf, 2015; Rasenberg et al., 2017), customized foot orthoses and low-dye

taping were judged likely to be beneficial, and short-term corticosteroid injection was likely beneficial in the short term but likely ineffective or harmful in the longer term. Several widely used measures – night splints, heel pads, stretching, and surgery – remained of uncertain effectiveness on current evidence, and most estimates rested on low- or very-low-certainty evidence owing to heterogeneity, small samples, and short follow-up. Table 5 summarizes the principal modalities, their place in the stepwise pathway, their reported effect, and the associated certainty of evidence.

Table 5. Effectiveness of Management Modalities and Certainty of Evidence based on GRADE Assessment

Modality	Line / Phase	Reported effect	Certainty (GRADE)
Plantar fascia-specific + calf stretching	First-line	Effective; superior to isolated Achilles stretch; durable benefit	Low Moderate
Prefabricated / custom orthoses	First-line	Reduce pain, improve function; prefabricated non-inferior to custom	Low Moderate
Low-dye / calcaneal taping	First-line adjunct	Short-term first-step pain relief (~1 week)	Low
NSAIDs / analgesics	Adjunct	Short-term relief with other measures; limited alone	Low
Night splints	Selected patients	Conflicting; possible morning-pain benefit; poor adherence	Very low
Corticosteroid injection	Second-line	Short-term relief (≤ 3 mo); atrophy / rupture risk	Low
ESWT (focused / radial)	Chronic / recalcitrant	Improves pain and function short intermediate term	Very low Low
PRP / autologous blood	Chronic	$\approx$ or superior to corticosteroid at longer follow-up	Low
Dextrose prolotherapy	Chronic	Comparable to ESWT; short intermediate benefit	Very low
Botulinum toxin A	Chronic	Reduces pain / calf tension in some trials	Very low
Endoscopic plantar fasciotomy	Refractory (>6 12 mo)	AOFAS $\sim 56 \rightarrow 90$; $\sim 9\%$ complication rate	Very low
Gastrocnemius recession	Refractory + calf tightness	Improves pain and function	Low

Table.5. Summary of management modalities and certainty of evidence for effectiveness (synthesised from GRADE-based appraisals and included trials). ESWT, extracorporeal shockwave therapy; PRP, platelet-rich plasma;

Discussions

Principal Findings

This systematic review integrated nine review-level sources and six primary studies to provide a consolidated account of the prevalence, assessment, and management of plantar fasciitis in adults. Three findings were consistent across the evidence base. First, plantar fasciitis is common and unequally distributed: point prevalence is approximately 0.85 1% of adults, with a two- to three-fold female predominance, a peak in middle age, and an approximately five-fold excess in obese individuals, and a substantially higher burden in running populations. Second, the condition is a degenerative fasciopathy rather than an inflammatory process, and its diagnosis is fundamentally clinical, with ultrasound now firmly established as the first-line imaging tool and MRI reserved for atypical or recalcitrant cases. Third, management follows a stepwise, low-risk-first logic, with more than 80 90% of patients improving on conservative care.

The epidemiological results clearly have a public health message: the populations with strong links to obesity, female sex and middle age may be more suitable targets for prevention and weight management, while the fact that these analgesics, including opioids, are frequently used despite weak evidence for benefit points to a disconnect between real life practice and trial data. The consistency of the reviews on a limited number of clinical signs and the basic ultrasound examination as the main confirmatory test, indicate that expensive imaging is not usually required for typical presentations.

Effectiveness of Management in Context

The best sources of information on effectiveness were the graded appraisals. They consider foot orthoses and taping to be effective and recommend short-term corticosteroid injection rather than surgery, and leave the effectiveness of night splints, stretching alone and surgery unclear. Regenerative injections and shockwave therapy seem to be useful for chronic and recalcitrant disease, but there is a lack of uniformity of

protocols, making it difficult to draw definite conclusions.. The randomised trials reinforced specific first-line recommendations the durable benefit of fascia-specific stretching and the cost-effective non-inferiority of prefabricated orthoses lending higher-certainty support to the conservative core of the pathway. Overall, the evidence favours escalating from low-risk, likely-beneficial measures to higher-risk interventions of more uncertain benefit, consistent with the four-phase framework identified in the review-level literature.

Strengths and Limitations

The main strength of this review is its integration of prevalence, assessment, and management within a single transparent, PICOS-driven framework, combining review-level and primary evidence and appraising each with a design-appropriate tool. The master mapping of studies to outcome domains makes the provenance of each conclusion explicit.

Several limitations should be acknowledged. The review was conducted by a single reviewer, which introduces potential selection and appraisal bias; this was mitigated by predefined criteria and documented decisions but not eliminated. Restriction to English-language, adult studies introduces language and spectrum bias. Most importantly, the underlying evidence base is itself limited: it is dominated by heterogeneous studies, and formal appraisal showed that most interventions were supported only by low- or very-low-certainty evidence, with few adequately powered head-to-head trials and little standardisation of outcomes or follow-up. Sports-specific and preventive evidence was especially sparse. These constraints mean that the effectiveness conclusions, while directionally consistent, should be regarded as provisional.

Implications and Future Research

The review assists with the clinical diagnosis, if necessary, with ultrasound, a step-wise approach from stretching, orthoses, taping, to injections, energy-based therapy, and rarely surgery. Research priorities include the

development of standardized core outcome sets, appropriately powered head-to-head comparisons of shockwave therapy with other regeneration and surgical treatments with 2+ years follow-up, prevention studies in high-risk populations (e.g. obese, older runners), and multi-modal stepwise pathways.

Conclusion

Plantar heel pain is common, usually self-limiting and may be very persistent and disabling, and is disproportionately seen in women, middle-aged and obese adults, and runners with plantar fasciitis. It is a degenerative fasciopathy that is most easily understood and is diagnosed clinically, and, if indicated, confirmed by ultrasound or MRI. The majority of patients will benefit from conservative treatment; the most cost-effective prefabricated orthoses and plantar fascia and calf stretching are first line treatment. The relief experienced from corticosteroid injection is short-lived and the structural risk is present and so is shockwave therapy and regenerative injections which are used for chronic and recalcitrant disease, only as a last resort. A step-wise process, prioritizing first the low-risk, likely-beneficial options is the most effective and safe approach. There are currently limited high-evidence research and a need for more rigorously designed and standardized studies to support the recommendations that are synthesized in this document.

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Ethical Approval

This study was reviewed and approved by the Ethics Committee of the Riphah College of Rehabilitation & Allied Health. Riphah international, University Islamabad, Pakistan.

Conflict of Interest

All authors declare that they have no conflict of interest.

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