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Effects of Radial Shockwave Therapy on Pain and Function in Patients with Plantar Fasciitis: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202510061

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 January 2025 and was last updated on 17 January 2025.

INTRODUCTION

Review question / Objective This systematic review aims to evaluate the effects of radial shockwave therapy, applied either as a standalone treatment or an adjunct to other interventions, compared to conservative physical therapy in reducing pain and improving functionality in individuals with plantar fasciitis.

Rationale Extracorporeal shockwave therapy (ESWT) has emerged as a treatment option for plantar fasciitis (PF), utilizing high-velocity mechanical waves to induce mechanobiological stimuli for tissue remodeling and pain relief. There are two main modalities: focal (F-SWT) and radial (R-SWT). F-SWT concentrates energy at a specific point, whereas R-SWT disperses energy eccentrically with lower peak pressures. Both approaches have shown improvements in pain, function, and quality of life in clinical trials. Systematic reviews on ESWT have highlighted its benefits, though evidence is often complicated by mixed modalities or comparator treatments. Recent analyses underscore the potential of R-SWT, although studies exclusively isolating its effects remain scarce. This review evaluates the effects of R-SWT alone or combined with conservative therapies for PF, comparing its outcomes to injectables, other conservative treatments, and placebo.

Condition being studied PF is a prevalent foot and ankle condition, affecting approximately 15% of the general population, with a higher prevalence in women aged 40–60 years. Its etiology is attributed to mechanical, degenerative, and metabolic factors, including triceps surae tension, limited hallux dorsiflexion, excessive plantar flexion, elevated BMI, and diabetes mellitus. Characterized by localized, acute heel pain that worsens with weight-bearing activities, PF significantly impairs functionality, restricting walking, running, and prolonged standing. Diagnosis is primarily clinical but may include

imaging techniques, with ultrasound often revealing plantar fascia thickening (>4 mm).
Management of PF includes a spectrum of strategies, ranging from conservative treatments to surgical interventions. Therapeutic ultrasound demonstrates inferior efficacy compared to placebo or exercise, while moderate-quality evidence supports plantar fascia-specific stretching exercises. Orthoses, whether custom or prefabricated, provide pain relief with comparable effectiveness. Injectable therapies, such as corticosteroids, show minimal short-term superiority over platelet-rich plasma or placebo. Surgical approaches, including cryosurgery and endoscopic plantar fascia release, exhibit promising medium-to-long-term outcomes but require further high-quality research to validate their efficacy.

METHODS

Search strategy The strategy to be implemented by the authors will encompass Medical Subject Headings (MeSH) terms and commonly used terms in the field, linked through Boolean operators such as OR and AND. The search will be conducted independently by two reviewers, with discrepancies resolved by consensus. For the population, the following terms will be included: "Fasciitis, Plantar (MeSH)", "Chronic plantar fasciitis", "plantar heel pain", "plantar fasciopathy", "painful heel", and "plantar fasciosis." For the intervention, the included terms will be: "radial extracorporeal shock wave", "radial shock wave", "radial shockwaves", "shockwave therapy", "Extracorporeal Shockwave Therapy (MeSH)", "extracorporeal shock wave", "extracorporeal shock-wave", "radial pressure wave", "ESWT", "RESWT", "RSWT", and "SWT." Finally, the terms for outcome measures will include: "Pain (MeSH)", "Physical Functional Performance (MeSH)", "Disability Evaluation (MeSH)", "function", and "disability."

Participant or population Adults with plantar fascitis.

Intervention Radial shockwave therapy alone or in combination with other physical therapies, such as conventional therapy, physical agents, exercises, or orthoses.

Comparator a) Injectable treatments, including prolotherapy, corticosteroids, and hyaluronic acid;
b) Conservative treatments, such as orthoses, stretching, exercise, and therapeutic ultrasound;
c) Placebo or sham therapy; d) Non-intervention control group.

Study designs to be included Randomized Controlled Trials (RCTs).

Eligibility criteria
- Study design: Randomized Controlled Trials (RCTs).
- Type of publication: Peer-reviewed articles published in scientific journals.
- Language: No restrictions applied.
- Timeframe: No temporal restrictions.
- Population: Adults diagnosed with plantar fasciitis.
- Intervention: Radial shockwave therapy alone or in combination with other physical therapies, such as conventional therapy, physical agents, exercises, or orthoses.
- Comparators: a) Injectable treatments, including prolotherapy, corticosteroids, and hyaluronic acid; b) Conservative treatments, such as orthoses, stretching, exercise, and therapeutic ultrasound;
c) Placebo or sham therapy; d) Non-intervention control group.
- Outcomes: Studies reporting pain and/or functionality (e.g., disability) as outcome measures.

Information sources The electronic databases to be used include PubMed, CINAHL, SCOPUS, Web of Science, and PEDro, covering the period from inception to January 2025. No filters will be applied to enhance the sensitivity of the search. In addition, Google Scholar will be searched, and the reference lists of selected studies will be manually reviewed to identify potentially relevant studies.

Main outcome(s) The outcomes include pain intensity and physical functionality, assessed using various scales and instruments.

Additional outcome(s) None.

Data management Two authors will independently extract data using a standardized form, resolving any discrepancies through consensus. The form will collect information on (i) author and year of publication, (ii) sample characteristics, (iii) intervention protocols, (iv) measurement instruments, and (v) main outcomes.

Quality assessment / Risk of bias analysis The methodological quality will be assessed using the PEDro scale, which includes 11 items, with scores ranging from 0 to 10 points (excluding item 1). Higher scores will indicate better study quality, categorized as follows: 9–10, excellent; 6–8, good; 4–5, fair; and <4, poor. The risk of bias (RoB) will be evaluated using the Cochrane Collaboration's Risk of Bias Tool version 2 (RoB 2) for clinical trials. Two authors will independently apply these tools,

and any disagreements will be resolved by consensus with a third author.

Strategy of data synthesis The studies will be meta-analyzed using Review Manager (RevMan) version 5.4.1, stratified by the comparator group. Heterogeneity will be assessed using the inconsistency index (I^2), categorized as follows: 'might not be important' (0–40%), moderate (30–60%), substantial (50–90%), and considerable (75–100%).

Subgroup analysis Subgroups will be created according to the type of outcome measure (pain or function).

Sensitivity analysis None.

Language restriction English only.

Country(ies) involved Chile.

Other relevant information None

Keywords Fasciitis, Plantar; Extracorporeal Shockwave Therapy; Pain; Disability Evaluation.

Dissemination plans Indexed scientific journal.

Contributions of each author
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