Majalah Ilmiah Fisioterapi Indonesia
Indonesian Scientific Journal of Physiotherapy

Case Reports / Case Studies
ISSN (Print): 2303-1921
ISSN (Online): 2722-0443
Volume 14, Number 2, Pages 407-411 (2026)
DOI: https://doi.org/10.24843/mifi.000001796

Physiotherapy Management of Plantar Fasciitis: A Case Report

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Received 8 April 2026; Revised 14 April 2026; Accepted 15 April 2026; Published 8 May 2026

Abstract

Introduction: Plantar fasciitis is one of the most common causes of heel pain and can significantly impair daily activities and quality of life. Although various physiotherapy interventions have been widely used, evidence describing the effectiveness of multimodal approaches in real-world clinical settings remains limited.

Objective: To describe the clinical outcomes of a multimodal physiotherapy intervention in a patient with plantar fasciitis.

Methods: This case report describes a 42-year-old female with a 6-month history of right plantar fasciitis. The patient underwent three sessions of physiotherapy, including infrared therapy, transcutaneous electrical nerve stimulation (TENS), and therapeutic ultrasound, combined with stretching and strengthening exercises. A home exercise program and patient education were also provided. Outcomes were assessed using the Numeric Rating Scale (NRS), ankle range of motion (ROM), Manual Muscle Testing (MMT), and the Foot and Ankle Disability Index (FADI).

Results: Pain during movement decreased from 7/10 to 5/10, and tenderness decreased from 4/10 to 2/10. Ankle dorsiflexion improved from 30° to 35°. Functional ability increased from 79% to 80% based on FADI scores. Muscle strength improved from grade 4/5 to 5/5 in ankle dorsiflexion and plantarflexion.

Discussion: The findings suggest that a multimodal physiotherapy approach may contribute to pain reduction and functional improvement in plantar fasciitis. However, the short duration of intervention may limit improvements in muscle strength. Further studies with longer intervention periods and larger samples are required.

Keywords
Plantar Fasciitis; Physical Therapy Modalities; Exercise Therapy; Rehabilitation; Foot Pain

Introduction

Plantar fasciitis is one of the most common causes of chronic heel pain in adults, affecting both physically active individuals and those with sedentary lifestyles.[1] It is primarily associated with repetitive mechanical loading at the insertion of the plantar fascia on the medial calcaneal tubercle and is frequently linked to limited ankle dorsiflexion and gastrocnemius tightness.[2] Clinically, patients typically present with sharp heel pain during the first steps in the morning or after prolonged periods of rest, which may significantly impair mobility and daily function.

Although plantar fasciitis was historically considered an inflammatory condition, current evidence indicates that it is predominantly a degenerative disorder characterized by collagen disorganization, microtears, and myxoid degeneration without significant inflammatory cell infiltration.[2,3] This paradigm shift has important implications for treatment strategies, emphasizing tissue remodeling, load management, and biomechanical correction rather than solely targeting inflammation.[4]

The plantar fascia plays a critical role in maintaining the longitudinal arch of the foot by providing passive support and facilitating efficient load transfer during gait.[5] Disruption of this structure due to repetitive stress can lead to altered biomechanics, increased plantar pressure, and persistent pain. Epidemiological studies suggest that plantar fasciitis affects approximately 10% of the population during their lifetime, with a higher prevalence among individuals aged 45–65 years and those engaged in occupations requiring prolonged standing or walking.[6] Additional risk factors include reduced ankle dorsiflexion, abnormal foot posture, increased body mass index, and inappropriate footwear, all of which contribute to excessive strain on the plantar fascia.[7]

Physiotherapy is widely recognized as a cornerstone in the conservative management of plantar fasciitis, offering a range of non-pharmacological interventions aimed at pain reduction, restoration of mobility, and functional improvement.[8] Commonly used approaches include electrotherapy modalities such as infrared therapy, transcutaneous electrical nerve stimulation (TENS), and therapeutic ultrasound, as well as exercise-based interventions including stretching and strengthening programs.[9,10] These interventions are believed to work through mechanisms such as neuromodulation, increased local circulation, enhanced tissue extensibility, and improved neuromuscular control.[11]

Despite the widespread use of these interventions, the current literature shows variability in outcomes, particularly regarding the optimal combination, dosage, and duration of therapy.[12] Most existing studies focus on isolated interventions or controlled experimental settings, while evidence describing the effectiveness of integrated multimodal physiotherapy approaches in real-world clinical practice remains limited.[13] Furthermore, there is a lack of detailed clinical reports that comprehensively document patient characteristics, intervention protocols, and short-term outcomes using standardized measures.[14]

This case is reported because it provides a detailed description of a multimodal physiotherapy approach implemented in a real clinical setting, integrating electrotherapy and exercise therapy tailored to the patient's functional limitations. The report aims to address the existing gap by presenting clinically relevant data on pain, range of motion, muscle strength, and functional outcomes following a short-term intervention. Therefore, the objective of this study is to describe the clinical outcomes of a multimodal

physiotherapy intervention in a patient with plantar fasciitis, with a focus on its effects on pain intensity, ankle range of motion, muscle strength, and functional ability.

Methods

This study employed a case report design following the CARE (CAse REport) guidelines to describe the clinical management and outcomes of a patient with plantar fasciitis in a real-world clinical setting. The study was conducted at the Department of Medical Rehabilitation, RSU PKU Muhammadiyah Jatinom, Klaten, Indonesia.

The patient was a 42-year-old female working as a market vendor, presenting with a 6-month history of right heel pain associated with prolonged standing during occupational activities. The pain was described as a stabbing sensation, particularly during weight-bearing activities such as walking and standing.

The patient had no known history of chronic systemic diseases such as diabetes mellitus or rheumatoid arthritis. No prior history of lower limb musculoskeletal disorders was reported. The patient had previously received pharmacological management, including pregabalin 75 mg, gabapentin 100 mg, ibuprofen 400 mg, and methylprednisolone 8 mg.

The patient's body mass index (BMI) was 25.3 kg/m², indicating an overweight category. Daily activities involved prolonged standing as part of occupational demands, with frequent weight-bearing throughout the day. The patient reported the use of sandals without specific arch support during daily activities. No relevant family history of musculoskeletal disorders was reported.

Clinical examination showed that the patient was fully conscious, cooperative, and hemodynamically stable, with vital signs within normal limits. Inspection revealed no visible edema, while palpation identified localized tenderness at the medial calcaneal region with slightly increased local temperature compared to the contralateral side. Pain intensity assessed using the Numeric Rating Scale (NRS) was 0/10 at rest, 4/10 on palpation, and 7/10 during movement.

Range of motion assessment using a goniometer demonstrated reduced ankle dorsiflexion on the affected side (20°–0°–30°) compared to the unaffected side (20°–0°–35°), while inversion and eversion were symmetrical bilaterally (30°–0°–20°). Compared to normal ankle dorsiflexion values (approximately 35°), the affected side demonstrated a mild limitation at baseline. Manual Muscle Testing (MMT) revealed muscle strength of grade 4/5 in ankle dorsiflexion and plantarflexion on the affected side. Functional ability assessed using the Foot and Ankle Disability Index (FADI) yielded a score of 79%, indicating mild functional limitation. These instruments are widely used and demonstrate good validity and reliability in musculoskeletal assessment.[9]

Special tests, including the Windlass test and Grifka test, were positive, supporting the involvement of the plantar fascia. The diagnosis of plantar fasciitis was established based on clinical findings, including localized heel pain, reduced dorsiflexion, and positive special tests. Differential diagnoses such as Achilles tendinopathy and calcaneal spur were considered less likely due to the absence of posterior heel pain and lack of supporting clinical features. Imaging was not performed as the diagnosis was clinically evident and consistent with established criteria.[6] The diagnosis was primarily based on clinical presentation and functional impairment, consistent with established diagnostic criteria for plantar fasciitis.

The intervention consisted of a multimodal physiotherapy program combining electrotherapy and exercise therapy. Infrared therapy was applied for 15 minutes at a distance of approximately 45–60 cm to promote superficial heating and circulation. Transcutaneous electrical nerve stimulation (TENS) was administered in conventional mode with a frequency of 80–100 Hz and a pulse duration of 100 µs for 15 minutes to achieve analgesic effects. Therapeutic ultrasound was delivered at a frequency of 1 MHz with an intensity of 1.0–1.5 W/cm² in continuous mode for 5–8 minutes targeting the plantar fascia region. The patient demonstrated good adherence to the prescribed home exercise program, reporting consistent daily performance of the exercises as instructed.

Exercise therapy included static stretching of the plantar fascia and gastrocnemius muscle (3 repetitions, 30-second hold), as well as strengthening exercises such as calf raises and towel toe curls (2–3 sets of 10 repetitions). The patient was also provided with a structured home exercise program and education on activity modification, load management, and appropriate footwear. This multimodal approach was selected based on evidence suggesting synergistic effects of combined interventions in reducing pain and improving function. The intervention sessions were conducted over a one-week period, with a frequency of three sessions (approximately 2–3 days between sessions). To provide a clear chronological overview of the clinical course, the timeline of the patient's condition, intervention sessions, and outcomes is presented in Table 1.

Table 1. Timeline of Clinical Course and Intervention

Phase	Description
April 2025	Onset of right heel pain
April 2025	Diagnosis of plantar fasciitis at primary care
Referral phase	Referral to medical rehabilitation
T1	Baseline assessment (NRS, ROM, MMT, FADI) and first intervention
T2	Second intervention and reassessment
T3	Third intervention and final evaluation

Outcome measures were recorded at each session (T1, T2, and T3), including pain intensity (NRS), range of motion (ROM), muscle strength (MMT), and functional ability (FADI). Changes were analyzed descriptively using absolute differences across sessions. Given the nature of a single case report, no inferential statistical analysis was performed.

Ethical considerations were strictly observed. This study received ethical exemption approval from the Health Research Ethics Committee, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta (No. 2098/KEPK-FIK/IV/2026), valid from April 09, 2026 to April 09, 2027, in accordance with WHO 2011 standards and CIOMS 2016 guidelines. Written informed consent was obtained from the patient prior to data collection and publication. Patient confidentiality and anonymity were fully maintained throughout the study.

Efforts to minimize bias included the use of standardized outcome measures, consistent assessment procedures, and clear documentation of intervention protocols. However, potential influences such as placebo effects and natural recovery cannot be entirely excluded.

Results

A total of three physiotherapy sessions were completed (T1–T3). Outcomes were assessed at each session using the Numeric Rating Scale (NRS), range of motion (ROM), Manual Muscle Testing (MMT), and the Foot and Ankle Disability Index (FADI). The results are presented below. To provide a clear overview of pain progression across sessions, the changes in pain intensity are summarized in Table 2.

Table 2. Pain Intensity Measured by Numeric Rating Scale (NRS)

Parameter	T1	T2	T3	Δ (T1–T3)	% Change
Pain at rest	0	0	0	0	0%
Tenderness	4	4	2	-2	-50%
Pain on movement	7	6	5	-2	-28.6%

Pain at rest remained unchanged at 0/10 throughout all sessions. Tenderness decreased from 4/10 at baseline (T1) to 2/10 at T3 (Δ = -2; 50% reduction). The trend of pain intensity across sessions is illustrated in Figure 1.

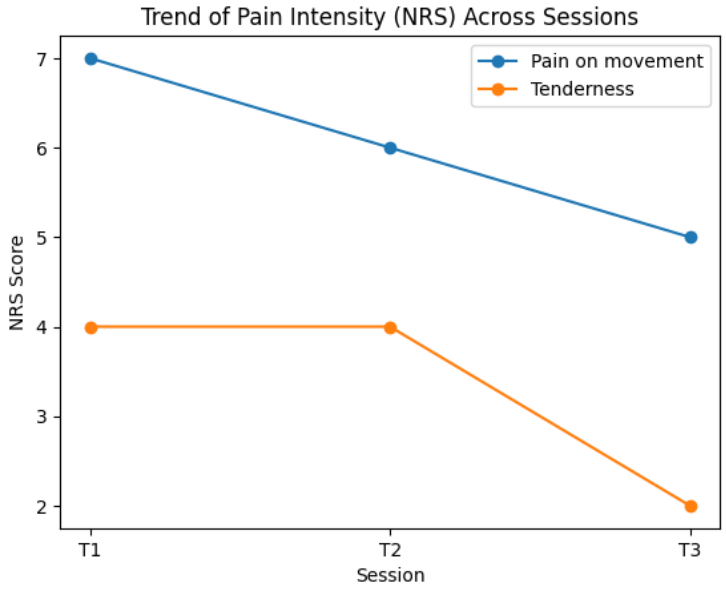

Figure 1. Trend of Pain Intensity (NRS) Across Sessions (T1–T3).

Pain during movement decreased from 7/10 at T1 to 5/10 at T3 (Δ = -2; 28.6% reduction). The changes in ankle range of motion are presented in Table 3.

Table 3. Ankle Range of Motion (ROM)

Movement	T1	T2	T3	Δ (T1–T3)
Plantarflexion–Dorsiflexion (Right)	20°–0°–30°	20°–0°–30°	20°–0°–35°	+5° (DF)
Plantarflexion–Dorsiflexion (Left)	20°–0°–35°	20°–0°–35°	20°–0°–35°	0°
Inversion–Eversion (Bilateral)	30°–0°–20°	30°–0°–20°	30°–0°–20°	0°

An increase in ankle dorsiflexion was observed on the affected side from 30° at T1 to 35° at T3 (Δ = +5°), while other movements remained unchanged. Muscle strength changes assessed using MMT are presented in Table 4.

Table 4. Muscle Strength (Manual Muscle Testing, MMT)

Muscle Group	T1 (Right)	T2 (Right)	T3 (Right)	Δ
Dorsiflexion	4/5	4/5	5/5	+1
Plantarflexion	4/5	4/5	5/5	+1
Inversion	5/5	5/5	5/5	0
Eversion	5/5	5/5	5/5	0

Muscle strength in dorsiflexion and plantarflexion increased from grade 4/5 at T1 to 5/5 at T3 (Δ = +1), while inversion and eversion remained unchanged. Functional ability measured using the FADI is presented in Table 5.

Table 5. Functional Ability (FADI Score)

Time Point	FADI (%)	Δ (T1–T3)	% Change
T1	79%		
T2	79%		
T3	80%	+1%	+1.27%

The FADI score increased from 79% at T1 to 80% at T3 (Δ = +1%; 1.27% increase), indicating a measurable change in functional ability across sessions.

Discussion

This case report describes the short-term outcomes of a multimodal physiotherapy intervention in a patient with plantar fasciitis, demonstrating reductions in pain, improvements in ankle range of motion, and modest gains in functional ability. The observed changes provide clinically relevant insights into the potential benefits of combining electrotherapy modalities with exercise-based interventions in routine clinical practice.

The reduction in pain intensity observed in this case is consistent with previous evidence supporting the use of electrotherapy modalities in managing musculoskeletal pain. Pain during movement decreased by 28.6%, and tenderness decreased by 50% over three sessions. Transcutaneous electrical nerve stimulation (TENS) is known to modulate pain through activation of the gate control mechanism and endogenous opioid release, contributing to analgesic effects in both acute and chronic conditions.[15] Infrared therapy may enhance local circulation and reduce muscle spasm through superficial heating, while therapeutic ultrasound has been reported

to facilitate tissue healing by promoting cellular activity and increasing blood flow.[16] The combined use of these modalities may therefore produce a synergistic effect, contributing to the observed pain reduction.

From a clinical perspective, the magnitude of pain reduction should be interpreted in relation to the minimal clinically important difference (MCID). Previous studies suggest that an MCID of approximately 2 points on the Numeric Rating Scale (NRS) represents a meaningful clinical improvement in musculoskeletal conditions. In this case, the reduction in movement-related pain from 7/10 to 5/10 (Δ = 2) meets this threshold, indicating that the improvement is not only statistically observable but also clinically meaningful.[17]

Improvements in ankle dorsiflexion were also observed, with an increase of 5° on the affected side. Limited dorsiflexion has been identified as a key contributing factor in plantar fasciitis, as it increases tension on the plantar fascia during gait.[18] The observed improvement may be attributed to the effects of stretching exercises targeting the plantar fascia and gastrocnemius muscle, which have been widely recommended as first-line interventions in plantar fasciitis rehabilitation.[19] Increased tissue extensibility and reduced stiffness may contribute to improved joint mobility and redistribution of mechanical load during weight-bearing activities.[20]

In contrast, changes in muscle strength were observed but should be interpreted with caution. Although MMT scores improved from grade 4/5 to 5/5 in dorsiflexion and plantarflexion, the short duration of intervention limits the extent to which true physiological strength adaptation can be assumed. Muscle strengthening typically requires longer intervention periods and progressive overload to induce structural and neuromuscular adaptations. Therefore, the observed improvement may partially reflect improved neuromuscular activation or reduced pain inhibition rather than substantial increases in muscle capacity.[21,22]

Functional improvement, as measured by the Foot and Ankle Disability Index (FADI), showed a modest increase of 1.27%. While this change indicates a positive trend, its clinical significance remains limited. Previous literature suggests that meaningful improvements in functional outcomes often require longer intervention periods and sustained adherence to exercise programs.[23] The relatively small change observed in this case is therefore likely influenced by the short duration of treatment (three sessions) and highlights the importance of continued rehabilitation through home exercise programs.[24]

The findings of this case are generally consistent with previous studies demonstrating the benefits of multimodal physiotherapy in plantar fasciitis management. However, unlike controlled trials, this report provides insight into the application of these interventions in a real-world clinical context, where treatment is often individualized and influenced by patient-specific factors. This highlights the practical relevance of multimodal approaches in routine physiotherapy practice. This case highlights the importance of early multimodal intervention to achieve clinically meaningful pain reduction in plantar fasciitis.

From a clinical perspective, this case suggests that a short-term multimodal physiotherapy program consisting of electrotherapy combined with stretching and strengthening exercises may be implemented as an initial management strategy for patients presenting with plantar fasciitis in outpatient settings. Early pain reduction and improvements in ankle mobility may facilitate patient participation in progressive rehabilitation programs.

Several limitations should be acknowledged. First, as a single case report, the findings cannot be generalized to broader populations. Second, the short duration of intervention limits the ability to assess long-term outcomes and sustainability of improvements. Third, the use of subjective outcome measures such as NRS and FADI introduces the potential for response bias. Fourth, the absence of imaging limits the ability to confirm structural changes in the plantar fascia. Additionally, potential confounding factors such as placebo effects and natural recovery cannot be entirely excluded.

Despite these limitations, this case report provides clinically relevant information regarding the implementation of a multimodal physiotherapy program for plantar fasciitis. The detailed description of intervention protocols and outcomes enhances reproducibility and may inform clinical decision-making in similar cases.

Future research should focus on larger sample sizes, longer intervention durations, and the use of controlled study designs to evaluate the effectiveness of multimodal physiotherapy approaches. Additionally, further investigation into optimal dosing parameters and individualized treatment strategies is warranted to improve clinical outcomes.

Conclusion

In this case, a multimodal physiotherapy intervention consisting of infrared therapy, transcutaneous electrical nerve stimulation (TENS), therapeutic ultrasound, and exercise therapy was associated with reductions in pain, improvements in ankle range of motion, and modest gains in functional ability in a patient with plantar fasciitis. The observed reduction in pain reached a clinically meaningful threshold, while improvements in functional outcomes were limited, likely due to the short duration of intervention.

These findings suggest that a combined physiotherapy approach may be beneficial in managing plantar fasciitis in a clinical setting; however, the results should be interpreted with caution given the single-case design and limited treatment duration. Therefore, generalization to broader populations is not warranted.

From a clinical perspective, this case highlights the potential value of integrating electrotherapy modalities with targeted exercise programs to address both symptom relief and functional recovery. Continued adherence to a home exercise program and longer intervention duration may be necessary to achieve optimal improvements, particularly in muscle strength and functional performance. Further research with larger sample sizes, longer follow-up periods, and controlled study designs is required to confirm these findings and to establish optimal treatment protocols for plantar fasciitis.

Author Contribution

Firhan Ahmad: Conceptualization, data collection, intervention implementation, data analysis, manuscript drafting, and final manuscript preparation.
Totok Budi Santoso: Supervision, methodology, data interpretation, critical manuscript review, and final approval of the manuscript.
Lathiifah Muknatun Amiin: Clinical supervision, physiotherapy intervention guidance, patient evaluation, and manuscript review.

Acknowledgments

The author would like to express sincere gratitude to all individuals and institutions who contributed to the completion of this study, particularly the staff of the Medical Rehabilitation Department at RSU PKU Muhammadiyah Jatinom for their support during the physiotherapy management process.

Conflict of Interest Statement

The author declares no conflict of interest.

Funding Sources

This research received no external funding.

Ethics Statement

This study received ethical exemption approval from the Health Research Ethics Committee, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta (No. 2098/KEPK-FIK/IV/2026), valid from April 09, 2026 to April 09, 2027, in accordance with WHO 2011 standards and CIOMS 2016 guidelines. Written informed consent was obtained from the patient prior to participation and publication. All patient data were anonymized to ensure confidentiality.

Patient Perspective

The patient reported a noticeable reduction in pain during daily activities, particularly during walking and prolonged standing. The patient also expressed satisfaction with the intervention and reported improved comfort when performing routine occupational tasks.

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