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EFFECT OF MYOFASCIAL RELEASE WITH OR WITHOUT TAPING IN THE PATIENTS WITH HEEL SPUR; A RANDOMISED CONTROLLED TRIAL

Original Research (ID: 1686)

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Acknowledgement: The authors gratefully acknowledge the participants and physiotherapy staff for their cooperation and support during the study.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: Plantar heel pain associated with heel spur is a common musculoskeletal problem that often limits walking, standing tolerance, and daily activity. Myofascial release is used to reduce fascial restriction and improve tissue mobility, while kinesiology taping is applied to support foot mechanics and unload the plantar fascia. Although both approaches are used in conservative rehabilitation, their combined clinical value in heel spur-related pain remains insufficiently established, particularly for function and ankle mobility.

Objective: To compare the effects of myofascial release with and without kinesiology taping on pain, foot function, and active ankle range of motion in patients with heel spur.

Methods: A randomized controlled trial was conducted on 38 participants with heel spur-related plantar heel pain. Participants were randomly allocated into Group A and Group B, with 19 participants in each group. Group A received myofascial release with standardized physiotherapy, while Group B received myofascial release with kinesiology taping along with the same baseline physiotherapy protocol. The intervention was delivered twice weekly for six weeks, comprising 12 sessions. Pain was assessed using the Visual Analog Scale, foot function through the Foot Function Index, and active dorsiflexion and plantar flexion range of motion using a universal goniometer. Data were recorded at baseline and after intervention.

Results: Final analysis included 18 participants in Group A and 17 participants in Group B. Median VAS reduced from 7.00 to 4.00 in Group A and from 7.00 to 3.00 in Group B. Pain improved significantly within both groups, but post-treatment between-group difference was not significant. FFI improved from 70.61 ± 9.27 to 40.72 ± 11.51 in Group A and from 71.41 ± 11.97 to 29.06 ± 12.95 in Group B. Dorsiflexion increased from 9.73° ± 1.69° to 14.51° ± 2.03° in Group A and from 9.64° ± 2.16° to 17.51° ± 2.19° in Group B. Plantar flexion increased from 36.13° ± 1.57° to 43.77° ± 1.97° in Group A and from 35.42° ± 2.21° to 47.22° ± 2.66° in Group B.

Conclusion: Myofascial release was effective for improving heel spur-related symptoms, while the addition of kinesiology taping produced greater improvement in foot function and ankle mobility. A combined rehabilitation approach may therefore offer better functional recovery in patients with heel spur.

Keywords: Athletic Tape; Fasciitis, Plantar; Heel Spur; Musculoskeletal Manipulations; Pain Measurement; Range of Motion, Articular; Treatment Outcome.

INTRODUCTION

Plantar heel pain is one of the most frequent and disabling complaints encountered in musculoskeletal and rehabilitation practice. It commonly presents as pain around the inferomedial aspect of the heel, particularly during the first few steps after waking or after a period of rest, and may worsen with prolonged standing, walking, or weight-bearing activities (1). Although this condition is often described clinically as plantar fasciitis or plantar fasciopathy, many symptomatic patients also demonstrate a calcaneal or heel spur, which is a bony outgrowth arising from the inferior aspect of the calcaneus near the insertion of the plantar fascia (2, 3). The presence of a heel spur does not always produce symptoms, as it may also be found incidentally in asymptomatic individuals; however, in patients with persistent heel pain, it is frequently associated with altered plantar loading, local soft-tissue irritation, reduced mobility, and difficulty in performing daily functional activities (4, 5). Heel spur-related plantar heel pain is clinically important because it affects not only pain perception but also walking tolerance, balance, work participation, and overall quality of life. Patients often report sharp first-step pain, heel stiffness, discomfort after prolonged sitting, and progressive limitation in routine tasks such as standing, climbing stairs, household work, and occupational activities (6). The condition is more commonly reported among middle-aged and older adults, and its development is influenced by several factors including increased body weight, prolonged standing, repetitive high-impact activity, altered foot posture, reduced ankle dorsiflexion, and excessive mechanical loading of the plantar fascia (6, 7). These factors may increase tensile stress at the calcaneal insertion of the plantar fascia, leading to repeated microtrauma, degenerative changes, fascial thickening, and periosteal irritation, which together contribute to persistent pain and functional disability (8).

The exact relationship between heel spurs and pain remains a matter of clinical debate. Some individuals with radiographic spurs remain asymptomatic, suggesting that the spur itself may not be the only source of pain. However, studies have reported a high prevalence of plantar calcaneal spurs among symptomatic patients, indicating that spurs may contribute to the mechanical environment in which plantar fascia irritation develops or persists (8). Histological evidence also suggests that plantar calcaneal spurs may contain vascularized and innervated connective tissue, which may partly explain why some patients experience pain in the presence of a spur (9,10). Therefore, heel spur syndrome should not be viewed purely as a bony problem; rather, it appears to involve a complex interaction between bone, fascia, muscle, neural sensitivity, altered foot mechanics, and repeated loading during functional activity. Conservative management is generally considered the first-line approach for plantar heel pain and heel spur-related symptoms. Commonly used interventions include stretching, strengthening, orthoses, manual therapy, taping, electrotherapeutic modalities, activity modification, and patient education (2). Among these approaches, myofascial release has gained attention because fascia is now recognized as an active connective tissue network involved in force transmission, proprioception, movement coordination, and pain modulation (11, 12). When fascial tissue becomes stiff, thickened, or restricted, it may reduce normal gliding between tissue layers, increase abnormal tension at the plantar fascia, and contribute to pain and movement limitation (13). These changes are particularly relevant in heel spur patients, where mechanical stress at the plantar fascia insertion may already be increased.

Myofascial release is a manual therapeutic technique designed to reduce fascial restriction, improve soft-tissue mobility, decrease tissue stiffness, and restore more normal load distribution across the foot and lower limb (14). It is commonly applied through sustained pressure, gentle traction, or slow stretching of restricted fascial tissues until a release or softening response is perceived (15,16). The proposed effects of myofascial release include mechanical changes in collagen alignment, improved tissue extensibility, enhanced fascial gliding, stimulation of mechanoreceptors, reduction in sympathetic activity, improved circulation, and modulation of nociceptive input (17-21). In patients with plantar heel pain, these effects may help reduce excessive tension on the plantar fascia, improve ankle and foot mobility, and decrease pain during weight-bearing tasks (16). Several studies have supported the clinical value of myofascial release in plantar fasciitis and plantar heel pain. Evidence suggests that myofascial release can significantly reduce pain and improve foot function when compared with sham treatment, conventional physiotherapy, or other conservative approaches (22-24). Some trials have also reported that adding myofascial release to conventional physiotherapy may produce greater improvement in Visual Analogue Scale scores and Foot Function Index outcomes than conventional treatment alone (25, 15). However, existing studies vary in terms of sample size, treatment duration, comparison groups, and diagnostic criteria. Importantly, many studies include patients under the broader diagnosis of plantar fasciitis without clearly distinguishing those with radiographically confirmed heel spur, which limits the direct application of findings to heel spur-specific rehabilitation.

Taping is another commonly used conservative intervention for plantar heel pain. It is applied to provide external support, modify foot mechanics, reduce strain on the plantar fascia, improve proprioceptive input, and produce short-term pain relief during functional activity (26-28). Kinesiology taping, low-dye taping, dynamic taping, and other taping techniques have been used in clinical practice, with several studies showing beneficial effects on pain, function, and foot mechanics in patients with plantar fasciitis (29). Taping may be particularly useful in the early phase of rehabilitation because it can immediately reduce mechanical load at the plantar fascia insertion and support the foot during walking or standing. However, its effects may be short-term and influenced by tape type, application method, tension, duration of wear, and patient-specific biomechanical factors (1, 30). The combined use of myofascial release and taping provides

 ISSN: 3007-2948

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a clinically logical approach. Myofascial release may improve soft-tissue mobility and reduce fascial tension, while taping may help maintain the corrected mechanical environment by supporting the plantar fascia during functional loading (30). In this way, taping may act as a supportive adjunct after manual release, helping to reduce immediate re-strain on mobilized tissues and allowing the patient to perform daily activities with less discomfort. Despite this rationale, the evidence regarding whether taping adds meaningful benefit to myofascial release remains inconsistent. Some studies suggest that combined interventions may improve pain and function, whereas others report that myofascial release alone, stretching-based programs, or other multimodal approaches may be equally or more effective (31). This inconsistency highlights the need for further controlled trials using clearly defined patient groups and standardized outcome measures.

A major gap in the current literature is the limited availability of randomized controlled trials specifically examining patients with heel spur rather than general plantar fasciitis. Since a heel spur may alter the mechanical environment at the plantar fascia insertion, patients with this condition may respond differently to interventions that target fascia mobility and mechanical support (32). Most available studies either combine heel spur and plantar fasciitis cases or fail to report whether calcaneal spurs were present, making it difficult for clinicians to determine the most appropriate treatment strategy for this subgroup. Therefore, a direct comparison of myofascial release with and without taping in patients diagnosed with heel spur is clinically relevant and may help guide evidence-based rehabilitation practice. The central research question of this randomized controlled trial is whether the addition of taping to myofascial release produces greater improvement in pain, foot function, disability, and ankle range of motion than myofascial release alone in patients with heel spur. It is hypothesized that both treatment approaches will improve clinical outcomes; however, myofascial release combined with taping may provide additional benefit by addressing both soft-tissue restriction and mechanical unloading during functional activity. On this basis, the objective of the present study is to compare the effects of myofascial release with and without taping on pain reduction, foot function, disability, and ankle range of motion in patients with heel spur, and to determine whether taping provides an added therapeutic advantage when used alongside myofascial release.

METHODS

The present study was conducted as a randomized controlled trial to compare the therapeutic effects of myofascial release alone with myofascial release combined with kinesiology taping in patients presenting with symptomatic heel spur-associated plantar heel pain. The trial was carried out in the outpatient physiotherapy department of Al Shafi Hospital, Lahore, where screening, baseline assessment, intervention sessions, and post-intervention evaluation were performed under the supervision of qualified physiotherapists. The total study duration was nine months after approval of the synopsis, including participant recruitment, baseline assessment, a six-week treatment phase, follow-up assessment, data entry, statistical analysis, and report writing. The sample size was calculated through OpenEpi for comparison of two means by using Foot Function Index values from a previous study, with Group A reported as 19.63 ± 6.24 and Group B as 26.47 ± 7.30. The calculation was performed at a 95% confidence level, 80% power, and equal allocation ratio, which yielded 16 participants in each group. After adjustment for possible attrition, 19 participants were recruited for each group, giving a total sample size of 38 participants (1, 33). A non-probability purposive sampling technique was used for recruitment, while group allocation was performed through a computer-generated randomization sequence to reduce allocation bias and ensure equal distribution between the two treatment arms.

Participants were screened from the outpatient physiotherapy setting. Adults with symptomatic plantar heel pain associated with heel spur were considered eligible if they were aged 30–40 years, had clinically symptomatic and radiographically confirmed heel spur, experienced heel pain for at least four weeks, reported morning first-step pain or pain after rest, had functional limitation related to heel pain, were able to follow the treatment schedule, and provided written informed consent (34,35). Participants were excluded if they had acute foot or ankle fracture, recent trauma, systemic inflammatory disease, neurological conditions affecting lower-limb sensation or gait, current physiotherapy treatment during the previous four to six weeks, skin allergy or open wound preventing taping, infection or dermatological disease at the taping site, long-term steroid use, regular use of strong analgesic or anti-inflammatory medication, cognitive impairment, or inability to attend the planned treatment sessions (36). A total of 58 participants were assessed for eligibility. Based on the corrected participant flow, 20 individuals did not proceed to randomization because they either did not meet the inclusion criteria or declined participation. The remaining 38 participants were randomized equally into two groups, with 19 participants allocated to Group A and 19 participants allocated to Group B. Group A received myofascial release intervention, while Group B received myofascial release followed by kinesiology taping. During follow-up, one participant from Group A was lost because of travel-related reasons, and two participants from Group B were lost to follow-up. Final analysis was therefore performed on 18 participants in Group A and 17 participants in Group B.

Before data collection, all eligible participants were informed about the purpose of the study, treatment procedures, expected benefits, possible discomfort, confidentiality of data, and their right to withdraw at any stage without any effect on their care. Written informed consent was obtained from each participant before enrollment. Ethical approval was obtained from the Ethical Review Committee of Al

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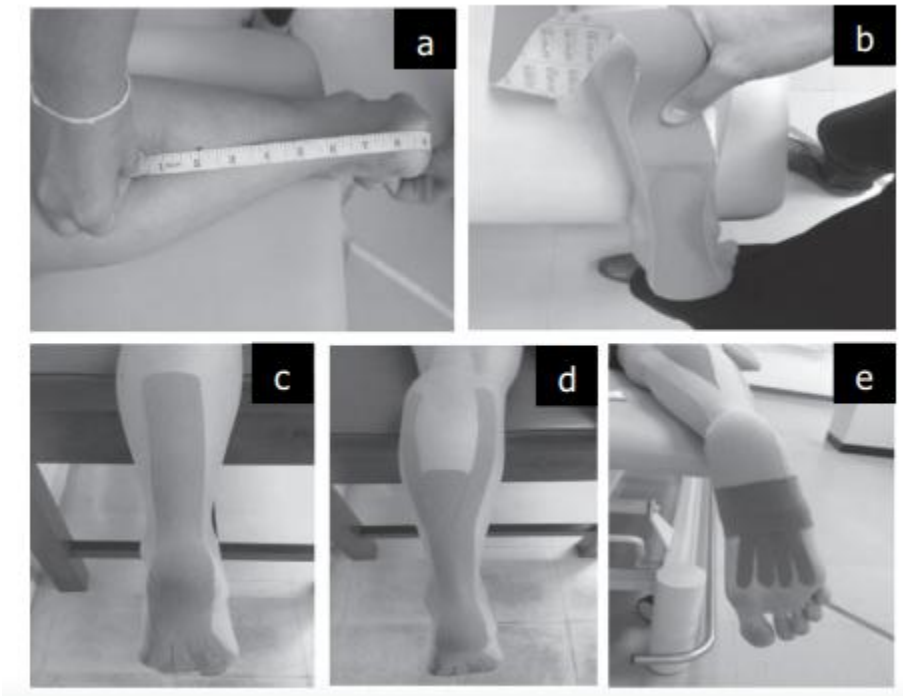
Shafi Hospital, Lahore (Clinic trial register number NCT 07588776). Data were collected using a predesigned proforma that included demographic information, symptom duration, relevant clinical history, activity level, baseline physical findings, and outcome measures. Pain intensity was measured through the Visual Analog Scale, which was recorded on a 10-cm scale ranging from 0 for no pain to 10 for the worst imaginable pain. Foot-related pain, disability, and activity limitation were assessed using the Foot Function Index, where higher scores indicated greater impairment. Active ankle range of motion, particularly dorsiflexion and plantar flexion, was measured in degrees using a universal goniometer. All outcomes were assessed at baseline and after completion of the six-week intervention period under similar testing conditions to maintain measurement consistency.

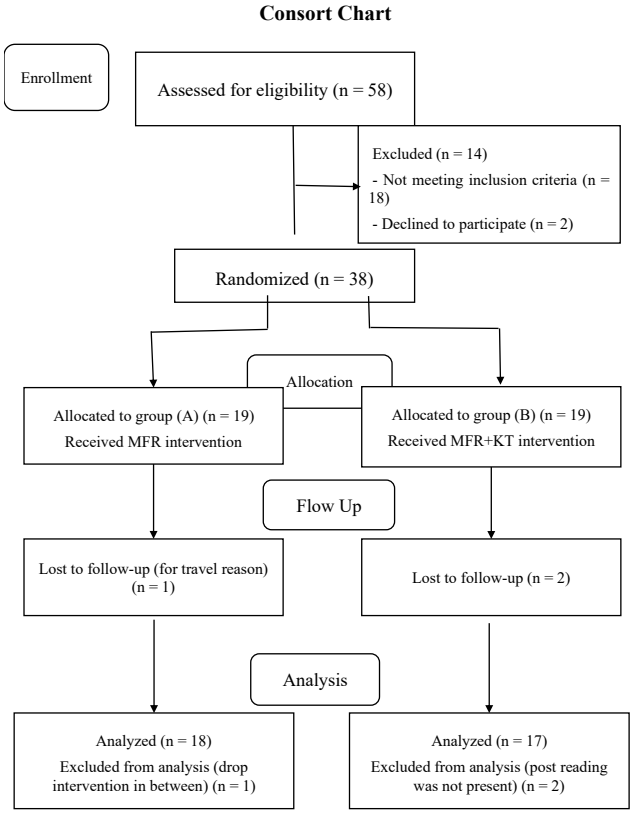
Participants in both groups received a standardized preparatory protocol before the main intervention. This included 10 minutes of gentle warm-up, ankle and foot mobility exercises, towel curl-ups, and light soft-tissue preparation of the plantar aspect of the foot. Active ankle dorsiflexion and plantar flexion exercises were performed slowly within a pain-free range, with 10 repetitions for each movement. Stretching exercises were also performed for the plantar fascia and Achilles tendon, with three sets of 30-second holds. For plantar fascia stretching, participants were instructed to stabilize the calcaneus and gently extend the toes until a stretch was felt along the plantar surface of the foot. For gastrocnemius stretching, participants stood with one leg forward and the affected leg behind, keeping the back knee straight and heel on the floor while leaning forward until a calf stretch was perceived (27, 32). In Group A, participants received myofascial release therapy from a trained physiotherapist. The technique was applied in the prone position over the plantar fascia, gastrocnemius, and soleus muscles using slow, sustained manual pressure. The purpose of the technique was to reduce fascial tightness, improve tissue mobility, decrease mechanical stress around the heel, and facilitate functional recovery. Each session lasted approximately 20–25 minutes, and participants received two sessions per week for six weeks, making a total of 12 treatment sessions. The same standardized approach was used throughout the treatment period to maintain consistency across participants (37).



Participants in Group B received the same myofascial release protocol as Group A, followed immediately by kinesiology taping. A 5-cm wide kinesiology tape was applied by a senior physiotherapist according to a standardized technique (27). Three tape strips were used to support the plantar fascia, Achilles tendon, gastrocnemius muscle, and medial longitudinal arch. The first strip was measured from the metatarsal heads to the musculotendinous junction of the soleus and Achilles tendon. It was applied with the foot positioned in dorsiflexion, beginning around the heel without tension and then extending along the Achilles tendon with controlled therapeutic tension. A fan-cut portion was applied toward the metatarsal region to support the plantar fascia. The second strip was cut in a Y-shape and applied along the Achilles tendon toward the medial and lateral heads of the gastrocnemius using a muscle inhibition approach. The third strip was applied over the mid-arch of the foot with mechanical correction to lift and support the longitudinal arch. Participants were advised to keep the tape in place for up to three days, continue routine daily activities, and remove the tape immediately if skin irritation, itching, discomfort, or any adverse reaction occurred (27). The primary outcome of the study was heel pain intensity measured through the Visual Analog Scale. Secondary outcomes included foot function measured by the Foot Function Index and active ankle range of motion measured by a universal goniometer. Outcome measurements were recorded before the intervention and at the end of

six weeks. The same measurement tools, testing environment, and assessment procedure were used for both groups to improve reliability and reduce measurement variation.

Data were entered and analyzed using Statistical Package for Social Sciences version 26. Continuous variables such as age, pain score, Foot Function Index score, and active range of motion were presented as mean and standard deviation, while categorical variables such as gender were presented as frequency and percentage. The Shapiro–Wilk test was used to assess normality of the data. Within-group pre- and post-intervention comparisons were performed using paired-sample t-tests for normally distributed variables and Wilcoxon signed-rank tests for non-normally distributed variables. Between-group comparisons were performed using independent-sample t-tests for normally distributed data and Mann–Whitney U tests for non-normally distributed data. Categorical variables were compared using chi-square or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant. Effect size was calculated using Cohen's d for parametric outcomes to determine the magnitude of clinical difference between the two intervention groups.



RESULTS

The study initially included 38 participants, with 19 participants allocated to the myofascial release group and 19 participants allocated to the myofascial release with kinesiology taping group. During follow-up, one participant from the myofascial release group and two participants from the combined intervention group were lost to follow-up. Therefore, the final post-intervention analysis was completed for 18 participants in the myofascial release group and 17 participants in the myofascial release with kinesiology taping group. The baseline age distribution was comparable between the two groups. The mean age in the myofascial release group was 35.84 ± 2.968 years, with an age range of 32 to 40 years. In the myofascial release with kinesiology taping group, the mean age was 34.68 ± 3.181 years, with an age range of 30 to 40 years. Based on the available summary data, the between-group difference in age was not statistically significant, $t = 1.16$, $p = 0.253$. The gender distribution was also relatively balanced. In the myofascial release group, 8 participants were male and 11 were female, representing 42.1% and 57.9%, respectively. In the myofascial release with kinesiology taping group, 10 participants were male and 9 were female, representing 52.6% and 47.4%, respectively. The gender distribution did not show a statistically significant difference between groups, $\chi^2 = 0.42$, $p = 0.516$.

The Shapiro–Wilk test was applied to assess the distribution of baseline variables. The pre-treatment pain score measured through VAS was not normally distributed, with a Shapiro–Wilk value of 0.933 and $p = 0.026$. The pre-treatment Foot Function Index score showed a normal distribution, with a Shapiro–Wilk value of 0.944 and $p = 0.055$. Active dorsiflexion range of motion was also normally distributed, with a Shapiro–Wilk value of 0.947 and $p = 0.071$. Active plantar flexion range of motion followed a normal distribution as well, with a Shapiro–Wilk value of 0.949 and $p = 0.083$. Therefore, non-parametric tests were applied for VAS scores, while parametric tests were applied for Foot Function Index and active range of motion variables. Pain scores decreased in both groups after the intervention. In the myofascial release group, the median pre-treatment VAS score was 7.00, with an interquartile range of 6.00 to 7.00. After treatment, the median VAS score decreased to 4.00, with an interquartile range of 3.00 to 4.00. In the myofascial release with kinesiology taping group, the median pre-treatment VAS score was also 7.00, with an interquartile range of 6.00 to 8.00. After treatment, the median VAS score decreased to 3.00, with an interquartile range of 2.00 to 4.50. The median reduction in pain was 3 points in the myofascial release group and 4 points in the myofascial release with kinesiology taping group.

Within-group analysis using the Wilcoxon signed-rank test showed a statistically significant reduction in VAS pain scores in both groups. In the myofascial release group, all 18 analyzed participants showed a reduction in pain score, with no positive ranks and no ties. The test statistic showed $Z = -3.780$ and $p < 0.001$. In the myofascial release with kinesiology taping group, all 17 analyzed participants also showed a reduction in pain score, with no positive ranks and no ties. The test statistic showed $Z = -3.650$ and $p < 0.001$. Between-group analysis showed no significant baseline difference in VAS scores between the two groups, $U = 180.000$, $Z = -0.015$, $p = 0.988$. Post-treatment pain scores were lower in the combined intervention group; however, the between-group difference did not reach statistical significance, $U = 102.500$, $Z = -1.706$, $p = 0.088$. Foot function improved in both groups after the intervention. In the myofascial release group, the mean Foot Function Index score decreased from 70.61 ± 9.268 before treatment to 40.72 ± 11.514 after treatment. The mean

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improvement was 29.889 points, with a 95% confidence interval of 26.703 to 33.075, t = 19.793, p < 0.001. In the myofascial release with kinesiology taping group, the mean Foot Function Index score decreased from 71.41 ± 11.974 before treatment to 29.06 ± 12.949 after treatment. The mean improvement was 42.353 points, with a 95% confidence interval of 40.226 to 44.480, t = 42.207, p < 0.001.

Between-group comparison of Foot Function Index scores showed no statistically significant baseline difference between the myofascial release group and the myofascial release with kinesiology taping group, with mean values of 71.37 ± 9.593 and 70.95 ± 11.549, respectively, p = 0.903. The baseline effect size was negligible, with Cohen's d = 0.04. After the intervention, the mean Foot Function Index score was 40.72 ± 11.514 in the myofascial release group and 29.06 ± 12.949 in the myofascial release with kinesiology taping group. The post-intervention between-group difference was statistically significant, with a mean difference of 11.663, 95% confidence interval of 3.248 to 20.079, t = 2.820, p = 0.008. The post-intervention effect size was large, with Cohen's d = 0.95. Active dorsiflexion range of motion increased in both groups. In the myofascial release group, mean dorsiflexion increased from 9.728° ± 1.6883° before treatment to 14.506° ± 2.0293° after treatment. The mean increase was 4.7778°, with a 95% confidence interval of 4.3071° to 5.2485°, t = -21.415, p < 0.001. In the myofascial release with kinesiology taping group, mean dorsiflexion increased from 9.641° ± 2.1610° before treatment to 17.512° ± 2.1906° after treatment. The mean increase was 7.8706°, with a 95% confidence interval of 7.2825° to 8.4587°, t = -28.370, p < 0.001.

Between-group analysis of active dorsiflexion range of motion showed no statistically significant baseline difference between the two groups, with mean values of 9.658° ± 1.6688° in the myofascial release group and 9.568° ± 2.0497° in the myofascial release with kinesiology taping group, p = 0.884. The baseline effect size was negligible, with Cohen's d = 0.05. After treatment, the mean dorsiflexion value was 14.506° ± 2.0293° in the myofascial release group and 17.512° ± 2.1906° in the combined intervention group. The post-treatment between-group difference was statistically significant, with a mean difference of -3.0062°, 95% confidence interval of -4.4574° to -1.5550°, t = -4.215, p < 0.001. The post-intervention effect size was large, with Cohen's d = 1.42. Active plantar flexion range of motion also increased in both groups. In the myofascial release group, mean plantar flexion increased from 36.133° ± 1.5718° before treatment to 43.772° ± 1.9712° after treatment. The mean increase was 7.6389°, with a 95% confidence interval of 7.0229° to 8.2549°, t = -26.165, p < 0.001. In the myofascial release with kinesiology taping group, mean plantar flexion increased from 35.418° ± 2.2114° before treatment to 47.224° ± 2.6558° after treatment. The mean increase was 11.8059°, with a 95% confidence interval of 11.1347° to 12.4771°, t = -37.286, p < 0.001.

Between-group analysis of active plantar flexion range of motion showed no statistically significant baseline difference between the two groups, with mean values of 36.016° ± 1.6112° in the myofascial release group and 35.295° ± 2.1516° in the myofascial release with kinesiology taping group, p = 0.250. After treatment, the mean plantar flexion value was 43.772° ± 1.9712° in the myofascial release group and 47.224° ± 2.6558° in the combined intervention group. The post-treatment between-group difference was statistically significant, with a mean difference of -3.4513°, 95% confidence interval of -5.0534° to -1.8492°, t = -4.383, p < 0.001. The post-intervention effect size was large, with Cohen's d = 1.48. The between-group comparison of VAS change showed that both groups demonstrated reduction in pain after treatment. The median VAS score decreased from 7.00 to 4.00 in the myofascial release group, indicating a median reduction of 3.00 points. In the myofascial release with kinesiology taping group, the median VAS score decreased from 7.00 to 3.00, indicating a median reduction of 4.00 points. The combined intervention group therefore showed a 1.00-point greater median reduction in pain compared with the myofascial release group. However, the post-treatment between-group comparison was not statistically significant, as the Mann–Whitney U test showed U = 102.500, Z = -1.706, and p = 0.088. These findings indicated that the addition of kinesiology taping produced greater numerical improvement in pain, but this difference did not reach statistical significance.

Overall, both groups showed statistically significant within-group improvement in pain, foot function, dorsiflexion range of motion, and plantar flexion range of motion. Between-group comparison showed that the myofascial release with kinesiology taping group had significantly better post-treatment outcomes for Foot Function Index, active dorsiflexion range of motion, and active plantar flexion range of motion. The post-treatment difference in VAS pain score favored the combined intervention group numerically, but it was not statistically significant.

Table 1: Baseline Demographic and Clinical Characteristics of Participants

Variable	Group A: MFR	Group B: MFR + KT	Test Used	p-value
Age, years, mean ± SD	35.84 ± 2.968	34.68 ± 3.181	Independent t-test	0.253
Male, n (%)	8 (42.1%)	10 (52.6%)	Chi-square test	0.516
Female, n (%)	11 (57.9%)	9 (47.4%)	Chi-square test	0.516
Pre-intervention VAS, median (IQR)	7.00 (6.00–7.00)	7.00 (6.00–8.00)	Mann–Whitney U test	0.988
Pre-intervention FFI, mean ± SD	71.37 ± 9.593	70.95 ± 11.549	Independent t-test	0.903

Pre-intervention DF AROM, mean ± SD	9.658 ± 1.6688	9.568 ± 2.0497	Independent t-test	0.884
Pre-intervention PF AROM, mean ± SD	36.016 ± 1.6112	35.295 ± 2.1516	Independent t-test	0.250

Table 2: Within-Group Comparison of Pain, Foot Function, and Ankle Range of Motion

Outcome	Group	Pre-intervention	Post-intervention	Change	Test statistic	p-value
VAS, median (IQR)	Group A: MFR	7.00 (6.00–7.00)	4.00 (3.00–4.00)	3.00 reduction	Z = -3.780	<0.001
VAS, median (IQR)	Group B: MFR + KT	7.00 (6.00–8.00)	3.00 (2.00–4.50)	4.00 reduction	Z = -3.650	<0.001
FFI, mean ± SD	Group A: MFR	70.61 ± 9.268	40.72 ± 11.514	29.889 reduction	t = 19.793	<0.001
FFI, mean ± SD	Group B: MFR + KT	71.41 ± 11.974	29.06 ± 12.949	42.353 reduction	t = 42.207	<0.001
DF AROM, mean ± SD	Group A: MFR	9.728 ± 1.6883	14.506 ± 2.0293	4.778 increase	t = -21.415	<0.001
DF AROM, mean ± SD	Group B: MFR + KT	9.641 ± 2.1610	17.512 ± 2.1906	7.871 increase	t = -28.370	<0.001
PF AROM, mean ± SD	Group A: MFR	36.133 ± 1.5718	43.772 ± 1.9712	7.639 increase	t = -26.165	<0.001
PF AROM, mean ± SD	Group B: MFR + KT	35.418 ± 2.2114	47.224 ± 2.6558	11.806 increase	t = -37.286	<0.001

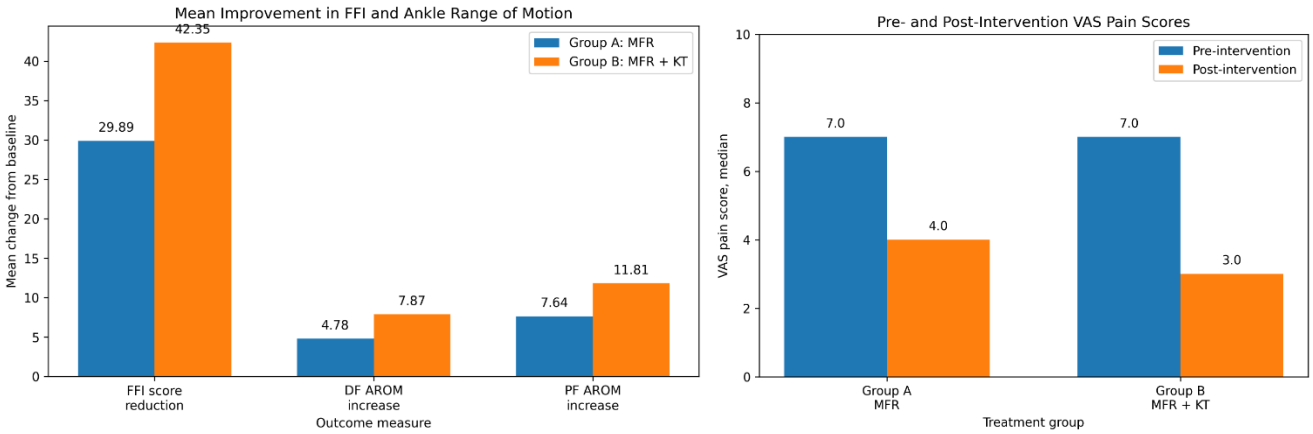
Table 3: Between-Group Comparison of VAS and Outcome Change Scores

Outcome	Group A Change	Group B Change	Between-Group Difference	Test statistic / 95% CI	p-value	Effect size
VAS reduction, median	3.00	4.00	1.00 greater reduction in Group B	Post-treatment U = 102.500, Z = -1.706	0.088	Not calculated
FFI reduction, mean ± SD	29.889 ± 6.407	42.353 ± 4.137	12.464 greater reduction in Group B	95% CI: 8.757 to 16.171	<0.001	Cohen's d = 2.30
DF AROM increase, mean ± SD	4.778 ± 0.947	7.871 ± 1.144	3.093 greater increase in Group B	95% CI: 2.367 to 3.819	<0.001	Cohen's d = 2.95
PF AROM increase, mean ± SD	7.639 ± 1.239	11.806 ± 1.306	4.167 greater increase in Group B	95% CI: 3.290 to 5.044	<0.001	Cohen's d = 3.28

Table 4: Between-group comparison of VAS change score

Variable	Group A (MFR), n = 18	Group B (MFR + KT), n = 17	Between-group difference	Statistical interpretation
Pre-treatment VAS, median (IQR)	7.00 (6.00–7.00)	7.00 (6.00–8.00)	0.00	Baseline pain was comparable between groups
Post-treatment VAS, median (IQR)	4.00 (3.00–4.00)	3.00 (2.00–4.50)	1.00 lower in Group B	Group B showed lower post-treatment pain
VAS change score, median reduction	3.00	4.00	1.00 greater reduction in Group B	Greater numerical pain reduction was observed in Group B

U = 102.500, Z = -1.706, p = 0.088



DISCUSSION

The present randomized controlled trial was conducted to compare the effects of myofascial release alone and myofascial release combined with kinesiology taping in patients with heel spur-related plantar heel pain. The findings showed that both treatment approaches produced significant within-group improvement in pain intensity, foot function, active dorsiflexion range of motion, and active plantar flexion range of motion after the intervention period. However, the combined intervention demonstrated greater post-treatment improvement in functional disability and ankle range of motion when compared with myofascial release alone. Pain scores also improved more numerically in the combined intervention group, but the between-group difference for post-treatment VAS did not reach statistical significance. Therefore, the added value of kinesiology taping appeared clearer for foot function and ankle mobility than for pain intensity alone. The clinical relevance of these findings lay in the fact that heel spur-related plantar heel pain was not only a soft-tissue pain condition but also a biomechanical disorder involving the plantar fascia insertion, calcaneal loading, fascial stiffness, and altered foot mechanics. In patients with heel spur, repeated traction at the calcaneal attachment of the plantar fascia may lead to chronic mechanical irritation, reduced tissue mobility, and compensatory movement patterns. For this reason, an intervention that addressed only pain might not be sufficient, whereas treatment directed toward fascial mobility, load redistribution, and mechanical support could provide broader functional benefit. The present findings supported this concept because the combined approach was associated with greater improvement in Foot Function Index scores and ankle range of motion, suggesting that kinesiology taping may have added a supportive biomechanical effect when applied after myofascial release.

The improvement observed in both groups was consistent with previous evidence indicating that myofascial release was beneficial for plantar heel pain and plantar fasciitis. Earlier clinical work comparing myofascial release combined with conventional physiotherapy against conventional therapy alone reported greater improvement in pain and foot function in the group receiving myofascial release as an additional intervention (38). The present trial showed a similar pattern, as myofascial release formed the core intervention in both groups and resulted in significant improvement from baseline. This supported the therapeutic role of myofascial release in reducing fascial restriction, improving tissue extensibility, and restoring more efficient foot mechanics in patients with chronic heel pain. The findings also aligned with previous research in which myofascial release combined with stretching showed better clinical outcomes than myofascial release alone in patients with plantar fasciitis (39). In the present study, stretching and routine preparatory exercises were standardized in both groups, and kinesiology taping was the main differentiating component between the two treatment arms. Despite this difference in protocol design, the broader pattern remained similar, as the group receiving an adjunctive therapy with myofascial release demonstrated superior functional recovery. This suggested that myofascial release might serve as a strong base intervention, while an additional mechanical or mobility-focused component could enhance rehabilitation outcomes when applied in a structured manner.

The results were also comparable with studies that reported favorable effects of myofascial release compared with stretching-based approaches in heel spur or plantar fascia-related pain (40). Such evidence supported the selection of myofascial release as a central intervention in the present trial. Stretching may reduce tension across the plantar fascia and calf complex, but myofascial release may provide additional benefit by directly targeting fascial adhesions, soft-tissue stiffness, nociceptive sensitivity, and impaired gliding between tissue layers. This mechanism may be particularly relevant in heel spur-related symptoms, where chronic loading at the calcaneal insertion may maintain soft-tissue irritation and functional limitation. The combined intervention also corresponded with evidence favoring multimodal rehabilitation in heel spur-related pain. A previous study evaluating different physiotherapy interventions, including exercise programs, taping, ultrasound therapy, and other rehabilitation methods, reported that a combined or individualized physiotherapy approach contributed to pain reduction and functional improvement in patients with heel spur (7). The present trial added to this line of evidence by directly comparing myofascial release alone with myofascial release plus kinesiology taping. The superior

functional and range-of-motion outcomes in the combined group supported the clinical value of integrating manual therapy with external support rather than relying on a single modality.

Some earlier studies comparing myofascial release and taping as separate interventions reported that both approaches were effective, with some evidence favoring myofascial release for pain and functional improvement (41, 42). The present study differed because kinesiology taping was not tested as an isolated treatment; it was used as an adjunct immediately after myofascial release. This distinction was important because taping alone may offer temporary support and sensory input, whereas its use after soft-tissue mobilization may help maintain improved tissue positioning and reduce immediate mechanical strain during weight-bearing activities. The findings therefore suggested that the combination of internal fascial release and external mechanical support may provide a more practical rehabilitation effect than either component used independently. In contrast, some previous evidence reported that kinesiology taping alone produced better short-term pain and function outcomes than myofascial release in plantar fascia-related pain (16). The present findings partly supported the value of taping, although they did not show a statistically significant between-group advantage for pain intensity. This difference may have been related to variation in study population, intervention duration, taping method, outcome timing, and whether heel spur was specifically confirmed. The present results suggested that taping may have contributed more strongly to mechanical support and movement restoration than to pain reduction alone. Since pain in heel spur-related conditions may arise from multiple sources, including fascial irritation, periosteal stress, altered loading, and sensitization, a short-term pain score may not fully capture the functional benefit of taping.

The findings were also consistent with studies showing that combined taping and exercise-based interventions improved function in plantar fasciitis, even when pain reduction occurred across several treatment groups (27). Similarly, studies comparing dynamic taping and kinesiology taping with physiotherapy reported that taping could contribute to improved function, balance, neuromuscular control, and load distribution (26). In the present trial, the significant increase in dorsiflexion and plantar flexion in the combined intervention group may have reflected improved comfort during movement, enhanced proprioceptive feedback, better arch support, and reduced protective stiffness around the ankle-foot complex. These mechanisms may have allowed participants to move through a greater active range after treatment. However, the findings also needed to be interpreted cautiously because previous trials have suggested that the effects of kinesiology taping may be mainly short-term, especially for pain relief (31). The present study showed better functional and range-of-motion outcomes in the combined group after six weeks, but long-term retention was not assessed. Therefore, the results supported the short-term clinical usefulness of adding taping to myofascial release, but they did not confirm whether these benefits would remain after tape withdrawal or during longer follow-up. This point was important because taping may provide immediate unloading and neurosensory support, while sustained improvement may depend on tissue adaptation, exercise adherence, footwear modification, and correction of contributing biomechanical factors.

The study had several strengths. The randomized controlled design improved the internal validity of the findings and helped reduce selection bias. Computer-generated randomization supported more balanced allocation between the treatment groups. The use of validated clinical tools, including the Visual Analog Scale, Foot Function Index, and universal goniometer, provided assessment across pain, function, and objective movement-related outcomes. Another important strength was the clinical focus on heel spur-related plantar heel pain, as many previous studies had examined plantar fasciitis broadly without clearly separating patients with calcaneal spur. This made the present study more relevant for clinical settings where patients commonly present with chronic heel pain associated with radiographic heel spur. Despite these strengths, several limitations were present. The sample size was relatively small, which may have reduced the statistical power to detect between-group differences in pain scores, particularly because the post-treatment VAS difference favored the combined group but remained statistically non-significant. The final analysis was completed only for participants who remained available at follow-up, which suggested a per-protocol approach rather than a strict intention-to-treat analysis. The study was also limited to a narrow age range, which reduced the generalizability of findings to older adults, although heel spur is frequently encountered in middle-aged and elderly populations. In addition, the trial was conducted in a single clinical setting, which may limit external validity.

Other factors may also have influenced the outcomes. Daily activity level, occupational standing time, footwear use, body mass index, home exercise adherence, and analgesic intake were not described as strictly controlled variables. These factors could affect heel loading and symptom recovery. Blinding of participants and therapists was not possible due to the nature of the intervention, and assessor blinding was not clearly reported. Radiographic characteristics of the heel spur, such as size, shape, or location, were not analyzed in relation to treatment response. Adverse effects related to taping, including skin irritation or discomfort, were also not clearly reported. These missing details limited the ability to judge treatment safety, feasibility, and subgroup-specific effectiveness. Future studies should include larger sample sizes, multicenter recruitment, broader age groups, and longer follow-up periods to determine whether the observed functional and range-of-motion improvements persist after the treatment period. Future trials should also consider assessor blinding, intention-to-treat analysis, standardized monitoring of footwear and daily activity, and documentation of adherence and adverse events. Objective biomechanical outcomes, such as plantar pressure analysis, gait parameters, arch height index, and radiographic spur characteristics, would help clarify how myofascial release and taping influence mechanical loading in heel spur-related pain. Comparative trials including myofascial release alone, taping alone, combined therapy, and sham taping would further strengthen the evidence regarding the independent and additive effects of each intervention.

Overall, the present study suggested that myofascial release was an effective conservative intervention for patients with heel spur-related plantar heel pain, while the addition of kinesiology taping produced greater improvement in foot function and ankle range of motion. The pain findings favored the combined group numerically but did not show a statistically significant between-group difference. Therefore, the combined approach appeared clinically promising, particularly for improving functional recovery and ankle mobility, but its superiority for pain reduction required confirmation through larger and methodologically stronger trials.

CONCLUSION

The study concluded that myofascial release was an effective conservative treatment for reducing heel spur-related symptoms and improving functional recovery; however, its combination with kinesiology taping provided greater overall clinical benefit. The added taping support appeared to enhance foot function and ankle movement by combining soft-tissue release with external mechanical support during activity. These findings suggest that a combined rehabilitation approach may be more useful than myofascial release alone for patients with heel spur, particularly when the treatment goal is not only pain relief but also better mobility, improved function, and safer return to daily activities.

AUTHOR CONTRIBUTION

Author	Contribution
Dr. Sehrish Shahzad	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision
Dr. Zermeen Zerish	Methodology, Investigation, Data Curation, Writing - Review & Editing
Prof Dr Fahad Tanveer	Investigation, Data Curation, Formal Analysis, Software
Dr Muhammad Bin Zia	Software, Validation, Writing - Original Draft
Mohtishim Ahmed	Formal Analysis, Writing - Review & Editing
Dr. Bisma Saleem	Writing - Review & Editing, Assistance with Data Curation

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