Original Article

COMPARATIVE EFFECTS OF KINESIO TAPING AND SOFT TISSUE MOBILIZATION ON CALF MUSCLE AND ACHILLES TENDON AMONG THE PATIENTS WITH PLANTAR FASCIITIS

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Abstract

Objective: This study aimed to compare the effects of Kinesio Taping (KT) and Instrument-Assisted Soft Tissue Mobilization (IASTM) on heel pain and ankle dorsiflexion range of motion (ADROM) in patients with plantar fasciitis.

Study Design: A Quasi-experimental comparative study was conducted.

Place and duration of study: The study was conducted at Allied Hospital and Civil Hospital, Faisalabad, from 1st March to 31st May 2025..

Material and Methods: A total of 30 participants aged between 21 and 50 years, diagnosed with plantar fasciitis, were selected using purposive sampling and equally divided into two groups (n=15 each). Group 1 received Kinesio Taping (KT) applied three times per week for four weeks, with each application maintained for 48 hours. Myofascial release techniques were applied prior to taping as a preparatory intervention. Group 2 received Instrument-Assisted Soft Tissue Mobilization (IASTM) targeting the calf musculature and Achilles tendon, also administered three times weekly over a period of four weeks. Outcome measures included pain intensity, assessed using the Visual Analogue Scale (VAS), and ankle dorsiflexion range of motion, measured with a universal goniometer. Assessments were conducted at baseline and at the end of the 4-week intervention period. Data analysis was performed using appropriate statistical tests, with significance set at $p \leq 0.05$.

Results: Both groups demonstrated statistically significant improvements in pain reduction and ankle dorsiflexion ROM following the intervention period ($p < 0.05$). However, Group 2 (IASTM) showed comparatively greater improvement in both outcome measures, with a highly significant difference ($p = 0.000$) when compared to Group 1 (KT). The magnitude of change in VAS scores and ADROM was more pronounced in the IASTM group, indicating superior therapeutic effectiveness

Conclusion: The findings of this study suggest that both Kinesio Taping and Instrument-Assisted Soft Tissue Mobilization are effective interventions for managing plantar fasciitis. However, IASTM demonstrated greater efficacy in reducing heel pain and improving ankle dorsiflexion range of motion. Therefore, IASTM may be considered a more beneficial treatment option in clinical practice for patients with plantar fasciitis.

Keywords: Achilles tendon, Calf Muscle, Fascia Tape, Kinesio Tape, KT and IASTM, Myofascial release, Plantar Fasciitis, Plantar Fasciopathy, Soft Tissue Mobilization.

1. Introduction

Plantar Fasciitis is a common foot pathology that affects ten percent of the population around the world and is more common in females than males. It will lead to heel pain, postural imbalance, falls, and disability. In clinical presentations, subjects with Plantar Fasciitis report difficulties in activities of daily living. They mostly complain about the pain in the lower part of the heel, which is worst 1st thing early in the morning or after prolonged standing(1). In recent studies, it has been revealed as a multi-factorial condition or pathology. The multiple factors are: pes cavus, pes planus, excessive external rotation, subtalar joint hyper-pronation, obesity, and inappropriate footwear.(2). Plantar Fascia is a band of connective tissue that moves along the dorsum of the foot, which protects the sole of the foot by absorbing shocks and helps to maintain the longitudinal arch. It has three main

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parts: thick central component, thin medial and lateral components. It connects to the medial tubercle proximally and five digital bands distally.(3). Due to repetitive use of this fascia, microtrauma occurs that causes pain on the medial side of the heel. During weight-bearing activities like standing and walking, the feet transfer the body's weight to the ground. If there is no pathology, balance will be maintained. But if there is plantar fasciitis, due to the discomfort and pain, the individual will adopt a compensatory gait pattern. They mostly adopt an antalgic gait where the time of heel contact with the ground decreases and anterolateral contact increases.(4). It has a prevalence rate between 8 and 25 percent in athletes, overweight persons, and subjects with low physical activity and poor quality of life.(5). Activity modification, ice massage, stretching exercises, orthotics, oral analgesics, and corticosteroid injections are examples of conservative therapy approaches for PF. Kinesio Taping, Soft Tissue Mobilization, and Ultrasound Therapy are other therapy possibilities.

Instrumental Assisted Soft Tissue Mobilization (IASTM), by contrast, employs precision-engineered tools to deliver amplified mechanical stimuli across soft tissues with greater specificity and depth than manual techniques alone. The method typically involves repetitive, unidirectional, or multidirectional strokes performed over lubricated skin to generate controlled micro-trauma in areas of soft tissue dysfunction. This mechanical loading promotes fibroblast activation, neo-collagenases, and the reorganization of disordered extracellular matrix components, processes essential to the resolution of chronic tendinopathy and myofascial adhesions(6). Beyond its regenerative potential, IASTM exerts profound neurosensory effects. By stimulating cutaneous and subcutaneous mechanoreceptors, specifically Ruffini endings and interstitial receptors. It enhances somatosensory perception and proprioceptive acuity, contributing to improved motor control and joint stability(7).

In plantar fasciitis, KT provides targeted support to the plantar arch, reduces tensile stress along the fascial band, and facilitates pain modulation through cutaneous stimulation and proprioceptive enhancement. It is a non-invasive and safe intervention in the treatment of Plantar Fasciitis.(8).Dr. Kenzo was the 1st who develop taping. The elasticity and the texture of Kinesio Tape are very different from the texture of conventional tapes. It is stretchable up to forty percent of its original length. It is resistant to water but permeable to air. In Musculoskeletal disorders, Kinesio Taping is used as a conservative management.(9)Functionally, KT can either stimulate or inhibit muscular activity based on the direction and degree of tension applied, making it particularly effective in re-educating dysfunctional movement patterns, offloading overactive muscles, and reinforcing underactive ones. These properties are particularly relevant in the context of plantar fasciitis, where aberrant foot biomechanics and muscle imbalances in the posterior chain contribute to chronic strain at the plantar fascia's enthesis.(10). Thus, the Rationale of this study was to see the comparative effects of Kinesio Taping and Instrumental Assisted Soft Tissue Mobilization in patients with Plantar Fasciitis on heel pain and Ankle Dorsiflexion Range of Motion

2. Materials & Methods

This study employed a quasi-experimental design and spanned a duration of three months from 01st March to 31st May 2025. The researchers utilized purposive sampling to select a sample size of 30 participants after their consent. Data collection took place in the Physical Therapy and Orthopedic Outpatient Departments (OPDs) of two government hospitals in Faisalabad: Allied Hospital and Civil Hospital.

Participants were included if they were between 21 and 50 years old, diagnosed with plantar fasciitis, experiencing sub-acute pain (over one month) in the medial heel and sole, had a positive windlass

test, and exhibited tenderness upon palpation of the sole or heel. Exclusion criteria were comprehensive, aiming to minimize confounding factors. Patients with heel pain due to calcaneal spur, skin irritation, neurological deficits (including stroke, spinal cord injury, neuropathy, multiple sclerosis), systemic illnesses like Cushing Syndrome, limb discrepancy, lower limb deformities (congenital or developmental), or lower extremity fractures were not included in the study.

The primary data collection tool for diagnosis was the Windlass Test. The Windlass Test is a common orthopedic test used by physiotherapists to assess Plantar Fasciitis. In this test, the patient will perform passive dorsiflexion of the first metatarsophalangeal joint. The test will be positive when the subject reports heel pain during dorsiflexion, which indicates the symptoms of Plantar Fasciitis. Pain levels were measured using the Visual Analogue Scale (VAS), and a goniometer was employed for any necessary range of motion measurements.

There were two groups (i.e., 15 persons in each group). The first group received Kinesio taping thrice in a week for four weeks and remained on the patients for two days after its application with myofascial release as a warm-up. The second group received the Instrumental Assisted Soft Tissue Mobilization Technique on the calf muscle and Achilles tendon thrice in a week for four weeks.

Kinesio Taping was applied in a prone position with the ankle joint in a neutral position with myofascial release as a warm-up, with the extended toes against the bed or ground. It was applied to the forefoot by stretching it to 25%. The tape was cut into 5 slices of equal width longitudinally. The last strap was applied by gentle compression across the base of the five slices beneath the foot and wrapped around the rear foot. It was also applied on the Achilles tendon and calf by cutting tape into a Y-shape thrice a week.

The therapeutic intervention involved the application of Instrumental Assisted Soft Tissue Mobilization (IASTM), administered thrice weekly, with each participant receiving a five-minute treatment duration. Utilizing the Edge Mobility Tool, the clinicians meticulously mobilized the musculature and plantar aspects of the foot. Before commencing the procedure, a lubricating medium was liberally applied to the posterior calf and plantar region of the foot to minimize dermal friction. Sustained pressure was then exerted along the entire leg and foot as the instrument was precisely manipulated. This manipulation involved a reciprocal motion, executed parallel to the tissue fibers, alternating between the proximal and distal extremities.

Data Analysis: Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 27. An independent t-test was applied on the quantitative variables, such as pain and range of motion, between the post values of the two groups. Bayesian One-way Repeated measures ANOVA was applied on the quantitative variables to evaluate differences within each group. Descriptive statistics were applied for age, gender, and BMI. The confidence interval was 95% for the analysis. P-value ≤ 0.05 was considered significant.

3. Results

The majority of participants (50%) were aged 37–44 years, followed by 29–36 years (23.3%), 45–50 years (16.7%), and 21–28 years (10%), indicating a predominance of middle-aged individuals. Females constituted 66.7% of the sample, while

males accounted for 33.3%, reflecting a moderate gender imbalance. Regarding BMI, 53.3% of participants fell within the normal range (21–24), 33.3% were in the 25–28 range, and 13.3% were between 17–20. Overall, the sample was primarily composed of middle-aged, female participants with a normal BMI, factors that may influence treatment outcomes in plantar fasciitis.

For each test, the degree of significance speaks for the p-value (P Value = 0.05). The results demonstrated that both Kinesio Taping (KT) and Instrumental Assisted Soft Tissue Mobilization (IASTM) are useful for improving ankle dorsiflexion range of motion (ADROM) and lowering discomfort ($p<0.05$).

But when both interventions were compared by applying the Independent Sample t-test between the post values of both groups, Instrumental Assisted Soft tissue Mobilization (IASTM) showed more statistical improvements in both reducing pain and increasing Ankle Dorsiflexion Range of Motion (ADFROM) than Kinesio Taping (KT) after 4 weeks of intervention.

Group Statistics

	Participants of groups	N	Mean	Std. Deviation	Std. Error Mean
Visual Analogue Scale after 4 weeks of intervention	KT Taping	15	3.00	.378	.098
	Soft tissue mobilization	15	1.00	.756	.195
Ankle Dorsiflexion range of motion after 4 weeks of intervention	KT Taping	15	2.67	.617	.159
	Soft tissue mobilization	15	1.27	.458	.118

Independent t-test:

The group statistical table compared outcomes for two variables. Visual Analogue Scale (VAS) and ankle Dorsiflexion Range of Motion, after 4 weeks of intervention.

KT Taping: The VAS mean is 3.00 with a standard deviation of 0.378, indicating a relatively low average pain score with some variability. The Ankle Dorsiflexion mean is 2.67, with a standard deviation of 0.617, suggesting moderate improvement in range of motion with relatively consistent results.

Soft Tissue Mobilization: The VAS mean is 1.00 with a standard deviation of 0.756, indicating a relatively low average pain score with some variability. The Ankle Dorsiflexion mean is 1.27, with a standard deviation of 0.4856, indicating improved consistency.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Visual Analogue Scale after 4 weeks of intervention	Equal variances assumed	6.146	.019	9.165	28	.000	2.000	.218	1.553	2.447
	Equal variances not assumed.			9.165	20.588	.000	2.000	.218	1.546	2.454
Ankle Dorsiflexion range of motion after 4 weeks of intervention	Equal variances assumed	2.491	.126	7.056	28	.000	1.400	.198	.994	1.806
	Equal variances not assumed.			7.056	25.823	.000	1.400	.198	.992	1.808

The Independent Samples Test results indicate significant differences between the two groups after 4 weeks of intervention for both outcome measures. For the Visual Analogue Scale (VAS), Levene's test showed unequal variances ($p = .019$), so the "equal variances not assumed" row is more appropriate. The t-test revealed a statistically significant difference ($p = .000$), with a mean difference of 2.000 (95% CI: 1.546 to 2.454), suggesting a meaningful reduction in pain. For Ankle Dorsiflexion Range of Motion, Levene's test showed equal variances ($p = .126$), so the "equal variances assumed" row is valid. The t-test again showed a significant difference ($p = .000$),

with a mean improvement of 1.400 degrees (95% CI: 0.994 to 1.806), indicating a notable increase in ankle mobility. These results support the effectiveness of the intervention in improving both pain and range of motion.

4. Discussion

The study utilized a standard goniometer to evaluate ankle dorsiflexion and the Visual Analogue Scale (VAS) to measure pain intensity. Each outcome variable was assessed at three time points: prior to the intervention, after two weeks of intervention, and after four weeks, which served as the final assessment. The Visual Analogue Scale, ankle dorsiflexion range of motion (ADROM) measured by goniometer, and pain pressure threshold have been widely used in previous studies to evaluate intervention effectiveness.

After four weeks of treatment, a statistically significant p-value was observed in the independent t-test used to compare VAS scores between groups. Similarly, the independent t-test used to compare the range of motion between Group A and Group B demonstrated significant p-values for all measured ranges. However, comparison of post-intervention values between groups indicated that Instrument-Assisted Soft Tissue Mobilization (IASTM) was more effective than Kinesio Taping (KT) in reducing pain and improving ankle dorsiflexion range of motion.

A study conducted by Ordahan et al., involving 80 individuals with plantar fasciitis, compared the effects of Extracorporeal Shockwave Therapy (ESWT) and Kinesio Taping. Outcome measures included pain assessed through VAS and ankle range of motion measured by a goniometer. The study concluded that both ESWT and KT improved pain levels, functional outcomes, and quality of life in individuals with plantar fasciitis, supporting the present findings. Another study further supports these findings, indicating that KT provides targeted support to the plantar arch, reduces tensile stress along the fascial band, and facilitates pain modulation through cutaneous stimulation and enhanced proprioception.

In contrast, Instrument-Assisted Soft Tissue Mobilization (IASTM) utilizes precision-engineered tools to deliver amplified mechanical stimuli to soft tissues with greater depth and specificity. The technique involves repetitive, unidirectional or multidirectional strokes applied over lubricated skin to induce controlled microtrauma in dysfunctional soft tissues. This process promotes fibroblast activation, collagen synthesis, and reorganization of the extracellular matrix, which are essential for the resolution of chronic tendinopathy and myofascial adhesions. One of the proposed mechanisms underlying its therapeutic effects is the frictional stimulation of tissues, which may enhance local blood circulation. Additionally, the application of the tool may induce localized tissue trauma, triggering an inflammatory response that facilitates tissue healing (Sillevis et al., 2020). These findings collectively support the literature and reinforce the study's conclusion.

Conclusion:

Results of the study showed that both Kinesio Taping (KT) and Instrument-Assisted Soft Tissue Mobilization (IASTM) were effective in reducing pain and improving ankle dorsiflexion range of motion in patients with plantar fasciitis over 4 weeks. However, IASTM demonstrated significantly greater improvements compared to KT in both outcome measures. Therefore, IASTM may be considered a more effective intervention for managing pain and enhancing ankle mobility in patients with plantar fasciitis.

Limitations

The absence of a centralized online repository for identifying or recruiting research participants posed significant challenges in accessing suitable patient cohorts. The study's three-month duration was marked by arduous and time-intensive data collection across multiple hospital sites. Some patients exhibited reluctance in disclosing personal health information, often due to feelings of vulnerability and fatigue associated with articulating their symptoms. The study duration and sample size were too small.

Future Recommendations

Future studies should include a larger sample size to increase the statistical power and improve the generalizability of the findings. A longer follow-up period is recommended to assess the sustainability of improvements in pain and Range of Motion. The duration of the intervention should be extended in future research to fully evaluate the long-term therapeutic effects. Conducting studies in broader clinical settings or involving participants from varied geographical and demographic backgrounds is recommended to ensure the wider applicability of the results.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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