

Effect of Dry Needling Combined with a Structured Exercise Programme versus Manual Therapy Combined with a Structured Exercise Programme on Pain in Athletes with Iliotibial Band Syndrome: A Comparative Study

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KEYWORDS

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Dry Needling; Manual Therapy;
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Abstract

Background:

Iliotibial Band Syndrome (ITBS) is one of the most common overuse injuries affecting athletes involved in repetitive running and jumping activities. The condition is characterized by lateral knee pain that interferes with athletic performance and functional training. Exercise-based rehabilitation remains the cornerstone of conservative management; however, adjunctive interventions such as manual therapy and dry needling are frequently incorporated to improve pain relief. Despite their widespread clinical use, evidence directly comparing the pain-relieving effects of these interventions when combined with the same structured exercise programme remains limited.

Objective:

To compare the effectiveness of Dry Needling combined with a structured exercise programme and Manual Therapy combined with the same exercise programme on pain intensity in athletes with Iliotibial Band Syndrome.

Methods:

A comparative interventional study was conducted among 60 athletes aged 18–40 years with clinically diagnosed Iliotibial Band Syndrome. Participants were randomly allocated into two equal groups. Group A received Manual Therapy with a structured exercise programme, whereas Group B received Dry Needling with the same exercise programme. Both groups underwent supervised treatment five sessions per week for six weeks. Pain intensity was assessed using the Visual Analogue Scale (VAS) before and after the intervention. Within-group and between-group comparisons were performed using paired and independent *t*-tests, with statistical significance set at $p < 0.05$.

Results:

Both intervention groups demonstrated statistically significant reductions in pain following six weeks of treatment ($p < 0.001$). The Manual Therapy group improved from 6.50 ± 1.11 to 5.43 ± 0.86 , whereas the Dry Needling group improved from 6.50 ± 1.11 to 3.57 ± 0.90 . Between-group analysis demonstrated significantly greater pain reduction in the Dry Needling group compared with the Manual Therapy group ($p < 0.001$).

Conclusion:

Both Manual Therapy and Dry Needling, when combined with a structured exercise programme, effectively reduced pain in athletes with Iliotibial Band Syndrome. However, Dry Needling produced significantly greater short-term pain reduction and may be considered the preferred adjunctive intervention for pain management during conservative rehabilitation.

Aim

To compare the effectiveness of Dry Needling and Manual Therapy, each combined with a structured

exercise programme, in reducing pain among athletes with Iliotibial Band Syndrome.

Objectives

1. To evaluate the effect of Manual Therapy combined with a structured exercise programme on pain intensity in athletes with Iliotibial Band Syndrome.
2. To evaluate the effect of Dry Needling combined with the same structured exercise programme on pain intensity in athletes with Iliotibial Band Syndrome.
3. To compare post-intervention pain outcomes between the two treatment groups using the Visual Analogue Scale.

Hypothesis

Null hypothesis (H₀): There is no significant difference between Manual Therapy combined with a structured exercise programme and Dry Needling combined with the same exercise programme in reducing pain among athletes with Iliotibial Band Syndrome.

Alternative hypothesis (H₁): Dry Needling combined with a structured exercise programme produces significantly greater pain reduction than Manual Therapy combined with the same exercise programme in athletes with Iliotibial Band Syndrome.

INTRODUCTION

Iliotibial Band Syndrome (ITBS) is one of the most frequently encountered overuse injuries affecting the lower extremity in athletes involved in repetitive running, cycling, football, and other sports requiring repeated knee flexion-extension movements. The condition is characterized by pain localized over the lateral aspect of the knee or distal thigh, which commonly worsens during activities such as running downhill, prolonged cycling, stair climbing, squatting, and jumping. ITBS represents a substantial proportion of sports-related knee injuries and is recognized as one of the leading causes of lateral knee pain among endurance athletes. Persistent pain associated with the condition frequently interferes with athletic performance, training continuity, and timely return to

sports, thereby emphasizing the importance of effective conservative management strategies.

The iliotibial band is a dense longitudinal thickening of the fascia lata extending from the iliac crest to Gerdy's tubercle on the anterolateral aspect of the proximal tibia. It receives fascial contributions from the tensor fasciae latae and gluteus maximus muscles and plays a crucial role in maintaining lateral stability of the hip and knee while transmitting forces during dynamic lower-limb activities. During repetitive loading, particularly between 20° and 30° of knee flexion, excessive compression of the highly innervated tissues beneath the distal iliotibial band has been proposed as one of the principal mechanisms responsible for pain generation. Contemporary evidence further suggests that hip abductor weakness, impaired neuromuscular control, altered lower-limb biomechanics, and myofascial restrictions may increase mechanical stress on the iliotibial band, thereby contributing to symptom persistence.

Pain is the primary complaint reported by individuals with ITBS and is often the principal factor limiting participation in sporting activities. Ongoing nociceptive input from irritated soft tissues may result in altered movement patterns, protective muscle guarding, reduced muscle activation, and progressive decline in athletic performance. Consequently, early reduction of pain is considered a fundamental objective of rehabilitation because it facilitates participation in therapeutic exercise, promotes restoration of normal movement, and may reduce the risk of chronic disability.

Conservative physiotherapy remains the first-line treatment for ITBS. Contemporary rehabilitation programmes generally combine patient education, activity modification, progressive strengthening of the hip abductors and external rotators, stretching exercises, neuromuscular retraining, and gradual return-to-sport activities. Although exercise therapy addresses the biomechanical impairments associated with ITBS and is regarded as the cornerstone of rehabilitation, adjunctive interventions aimed at accelerating pain reduction are frequently incorporated during the early stages of treatment.

Manual Therapy is one of the most commonly used adjunctive interventions in sports physiotherapy for

managing musculoskeletal pain. It encompasses a variety of techniques, including myofascial release, soft tissue mobilization, and joint mobilization, which are intended to decrease pain, improve tissue extensibility, restore mobility, and normalize movement patterns. Contemporary pain science suggests that the benefits of manual therapy are not solely attributable to mechanical effects on soft tissues but also involve neurophysiological mechanisms such as modulation of nociceptive processing, stimulation of mechanoreceptors, reduction of muscle guarding, and improvement in sensorimotor function. These mechanisms may contribute to short-term pain relief and facilitate more effective participation in rehabilitation exercises.

Dry Needling has emerged as another widely accepted physiotherapy intervention for managing myofascial pain associated with musculoskeletal disorders. The technique involves insertion of a sterile monofilament needle into myofascial trigger points or dysfunctional muscle tissue to reduce pain and improve neuromuscular function. Several physiological mechanisms have been proposed to explain its analgesic effects, including disruption of dysfunctional motor end-plate activity, reduction in spontaneous electrical activity within trigger points, activation of endogenous pain inhibitory pathways, increased local blood flow, and normalization of muscle tone. These responses may reduce peripheral nociceptive input and improve tolerance to movement and exercise.

Athletes with ITBS frequently demonstrate myofascial trigger points involving the tensor fasciae latae, gluteus maximus, gluteus medius, and vastus lateralis muscles. Persistent trigger point activity within these muscles may contribute to pain sensitization, altered muscle recruitment, and impaired lower-limb biomechanics. Consequently, Dry Needling has been proposed as an intervention capable of addressing these impairments while providing clinically meaningful pain relief during rehabilitation.

Although both Manual Therapy and Dry Needling are widely incorporated into physiotherapy programmes for ITBS, existing literature has predominantly evaluated each intervention independently or in comparison with conventional physiotherapy. Direct evidence comparing their relative effectiveness for pain reduction while controlling for exercise therapy remains limited,

particularly among athletic populations. Since exercise programmes are generally considered standard care, determining which adjunctive intervention provides greater pain relief may assist clinicians in selecting more effective treatment strategies during the early phases of rehabilitation.

Pain intensity is commonly assessed using the Visual Analogue Scale (VAS), a simple, valid, and reliable patient-reported outcome measure extensively used in musculoskeletal and sports rehabilitation research. The VAS provides a sensitive method for detecting changes in pain over time and is therefore appropriate as the primary outcome measure for evaluating treatment effectiveness in individuals with ITBS.

Accordingly, the present study was designed to compare the effectiveness of Dry Needling combined with a structured exercise programme and Manual Therapy combined with the same exercise programme in reducing pain among athletes diagnosed with Iliotibial Band Syndrome. By focusing specifically on pain outcomes while maintaining identical exercise protocols in both intervention groups, the study aims to provide clinically relevant evidence regarding the comparative analgesic benefits of these two commonly used physiotherapy interventions and support evidence-based decision-making in sports rehabilitation.

MATERIALS AND METHODS

Study Design

A prospective comparative interventional study with a pre-test and post-test design was conducted to compare the effectiveness of Manual Therapy (MT) and Dry Needling (DN), each combined with a structured exercise programme, on pain intensity in athletes diagnosed with Iliotibial Band Syndrome (ITBS).

Study Setting

The study was carried out in the Department of Physiotherapy, Pacific Medical College and Hospital, Udaipur, Rajasthan, India. Participant recruitment, intervention, and outcome assessment were completed over the designated study period following institutional ethical approval.

Participants

Sixty athletes clinically diagnosed with Iliotibial Band Syndrome participated in the study. Eligible participants were recruited using convenience sampling and randomly allocated into two equal intervention groups (n = 30).

- **Group A (n = 30):** Manual Therapy combined with a structured exercise programme.
- **Group B (n = 30):** Dry Needling combined with the same structured exercise programme.

Random allocation was performed before initiation of treatment to ensure equal representation in both intervention groups.

Eligibility Criteria

Inclusion Criteria

Participants fulfilling all of the following criteria were included:

- Male and female athletes aged between 18 and 40 years.
- Clinical diagnosis of Iliotibial Band Syndrome presenting with lateral thigh or lateral knee pain.
- Pain aggravated during running, jogging, hopping, jumping, prolonged sitting, stair climbing, squatting, or lifting activities.
- Willingness to participate and provision of written informed consent.

Exclusion Criteria

Participants were excluded if they had:

- Previous knee surgery.
- Knee ligament injury or meniscal pathology.
- Recurrent patellar instability.
- Knee subluxation.
- Neurological disorders affecting lower limb function.

- Other musculoskeletal conditions likely to influence pain assessment or rehabilitation outcomes.

Intervention Protocol

Both groups received supervised physiotherapy five sessions per week for six consecutive weeks. Each treatment session lasted approximately 45–60 minutes.

Group A: Manual Therapy + Structured Exercise Programme

Participants allocated to Group A received Manual Therapy directed towards the iliotibial band complex and associated musculature. Treatment consisted of clinically indicated soft tissue mobilisation, myofascial release, and joint mobilisation techniques, followed by a structured exercise programme.

The exercise programme included:

- Iliotibial band stretching
- Tensor fascia lata stretching
- Hip abductor strengthening
- Gluteal strengthening
- Core stabilisation exercises
- Progressive lower-limb strengthening
- Functional rehabilitation exercises

Exercise intensity was progressively increased according to participant tolerance throughout the intervention period.

Group B: Dry Needling + Structured Exercise Programme

Participants in Group B received Dry Needling administered using sterile disposable monofilament needles to clinically identified myofascial trigger points involving the iliotibial band complex and surrounding musculature.

Following Dry Needling, participants completed the same structured exercise programme as Group A to ensure consistency between rehabilitation protocols.

Maintaining an identical exercise programme in both groups enabled comparison of the adjunctive effects of Dry Needling and Manual Therapy on pain reduction.

Outcome Measure

Primary Outcome

Visual Analogue Scale (VAS)

Pain intensity was measured using the Visual Analogue Scale (VAS), a validated and reliable patient-reported

outcome measure widely used in musculoskeletal rehabilitation.

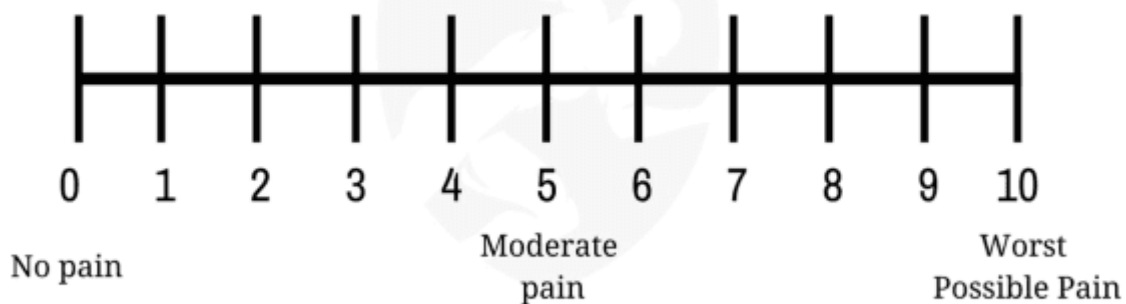
The scale consisted of a 10-cm horizontal line ranging from 0 ("No pain") to 10 ("Worst imaginable pain").

VAS scores were recorded at:

- Baseline (Week 0)
- Completion of treatment (Week 6)

The primary endpoint of the study was the change in VAS score following six weeks of intervention.

Visual Analog Scale (VAS)



Data Collection Procedure

Baseline demographic information including age, sex, body mass index (BMI), and sporting activity was recorded before commencement of treatment.

Pain assessment using the Visual Analogue Scale was performed before the first treatment session and repeated after completion of the six-week rehabilitation programme by the same assessment procedure.

All collected data were entered into Microsoft Excel and analysed using IBM SPSS Statistics Version 26.0.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics Version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were expressed as **mean ± standard deviation (SD)**, while categorical variables were presented as frequencies and percentages.

Normality of the data distribution was assessed before inferential analysis.

Within-group changes in pain intensity between baseline and post-treatment assessments were analysed using the paired *t*-test.

Between-group comparisons of post-treatment pain scores and mean improvement were performed using the independent *t*-test.

Statistical significance was established at **p < 0.05**.

In addition to *p*-values, effect sizes (Cohen's *d*) and 95% confidence intervals will be reported to facilitate

interpretation of the magnitude and clinical relevance of treatment effects.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee of Pacific Medical University, Udaipur, Rajasthan.

All participants provided written informed consent before enrolment. Confidentiality of participant information was maintained throughout the study, and all study procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

RESULTS

Table 1. Baseline Characteristics of Participants

Variable	Overall (N=60)
Age (years), Mean $\pm$ SD	28.8 $\pm$ 5.9
Male, n (%)	30 (50.0)
Female, n (%)	30 (50.0)
BMI (kg/m ²), Mean $\pm$ SD	23.4 $\pm$ 2.0
Normal BMI, n (%)	46 (76.7)
Overweight, n (%)	14 (23.3)
Running, n (%)	40 (66.7)
Cycling, n (%)	14 (23.3)
Football, n (%)	6 (10.0)

The majority of participants were runners, followed by cyclists and football players. Male and female athletes were equally represented.

Baseline Pain Comparison

Participant Flow

A total of **60 athletes** clinically diagnosed with Iliotibial Band Syndrome fulfilled the eligibility criteria and completed the study. Participants were randomly allocated into two equal intervention groups (n = 30 each). All enrolled participants completed the six-week intervention protocol, and no participant was lost to follow-up. Therefore, data from all sixty participants were included in the final statistical analysis.

Baseline Demographic Characteristics

The demographic characteristics of participants were comparable between the two intervention groups, indicating successful baseline matching.

Baseline pain intensity, measured using the Visual Analogue Scale (VAS), did not differ significantly between the intervention groups, demonstrating comparable pain severity before treatment.

Table 2. Baseline VAS Comparison

Group	Mean $\pm$ SD
A. Manual Therapy + Exercise	6.50 $\pm$ 1.11
B. Dry Needling + Exercise	6.50 $\pm$ 1.11

Between-group comparison:
 $p > 0.05$ (Not statistically significant)

These findings indicate that both groups had similar pain intensity before commencement of treatment.

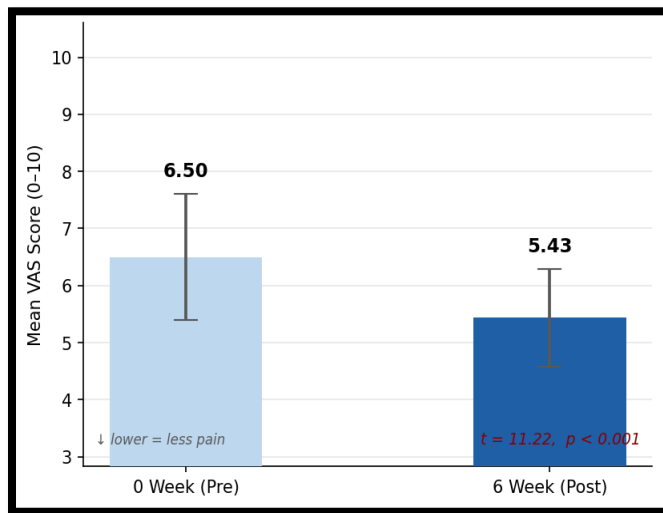
Within-Group Changes in Pain

Following six weeks of intervention, both treatment groups demonstrated statistically significant reductions in pain intensity.

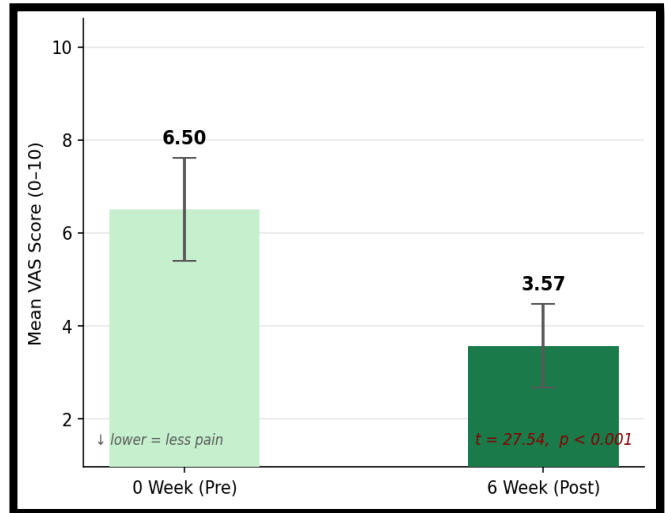
Table 3. Within-Group Comparison of VAS Scores

Group	Baseline	Week 6	Mean Change	<i>p</i> value
Manual Therapy + Exercise	6.50 ± 1.11	5.43 ± 0.86	−1.07	<0.001
Dry Needling + Exercise	6.50 ± 1.11	3.57 ± 0.90	−2.93	<0.001

Both intervention protocols significantly reduced pain after six weeks. However, the magnitude of improvement was considerably greater in participants treated with Dry Needling combined with a structured exercise programme.



Group A - VAS (0 vs 6 weeks)



Group B - VAS (0 vs 6 weeks)

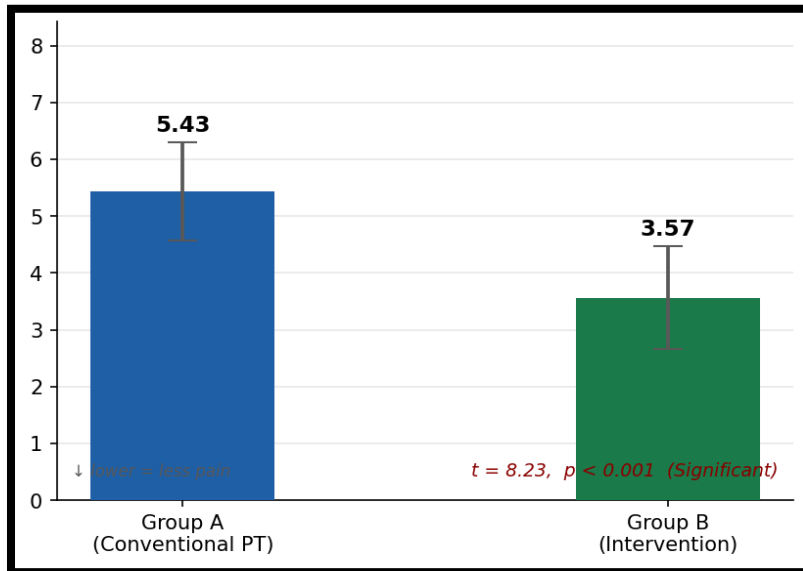
Between-Group Comparison

Comparison of post-intervention VAS scores demonstrated significantly lower pain intensity in the Dry Needling group.

Table 4. Between-Group Comparison of Post-treatment Pain

Outcome	Manual Therapy	Dry Needling	<i>p</i> value
Week 6 VAS	5.43 ± 0.86	3.57 ± 0.90	<0.001
Mean Improvement	1.07	2.93	<0.001

Participants receiving Dry Needling experienced approximately **2.7 times greater improvement in pain** compared with those receiving Manual Therapy.



Magnitude of Treatment Effect

To determine the clinical relevance of the interventions, the magnitude of pain reduction was evaluated.

Table 5. Clinical Interpretation of Pain Reduction

Parameter	Manual Therapy	Dry Needling
Mean Reduction in VAS	1.07	2.93
Percentage Improvement	16.5%	45.1%

The Dry Needling group demonstrated a substantially greater reduction in pain intensity than the Manual Therapy group, indicating superior short-term analgesic effectiveness when combined with the same structured exercise programme.

Summary of Findings

The principal findings of the present study were:

- Both Manual Therapy and Dry Needling, when combined with a structured exercise programme, significantly reduced pain in athletes with Iliotibial Band Syndrome.
- Baseline pain intensity was comparable between intervention groups.
- Dry Needling produced a greater reduction in pain than Manual Therapy.
- The mean reduction in VAS score in the Dry Needling group was almost three times that observed in the Manual Therapy group.

- The superior improvement associated with Dry Needling suggests that it may provide greater short-term analgesic benefit as an adjunct to exercise-based rehabilitation.

DISCUSSION

- The present study compared the effectiveness of Manual Therapy and Dry Needling, each combined with a structured exercise programme, in reducing pain among athletes diagnosed with Iliotibial Band Syndrome (ITBS). Pain intensity was evaluated using the Visual Analogue Scale (VAS) before and after a six-week rehabilitation programme. Both intervention groups demonstrated statistically significant reductions in pain; however,

participants who received Dry Needling combined with structured exercise experienced significantly greater improvement than those treated with Manual Therapy combined with the same exercise programme.

- The significant reduction in pain observed in both groups supports the role of multimodal physiotherapy in the conservative management of ITBS. Exercise therapy is considered the foundation of rehabilitation because it addresses hip muscle weakness, neuromuscular deficits, and altered lower-limb biomechanics commonly associated with the condition. When combined with adjunctive interventions aimed at reducing pain, exercise can facilitate improved participation in rehabilitation and enhance progression through functional loading. The findings of the present study suggest that both Manual Therapy and Dry Needling can complement exercise-based rehabilitation by reducing pain during the early stages of treatment.
- Participants receiving Manual Therapy demonstrated a statistically significant reduction in VAS scores following the intervention. These findings are consistent with previous reports indicating that manual therapy techniques, including myofascial release and soft tissue mobilisation, can reduce pain by improving soft tissue extensibility, decreasing local tissue sensitivity, and enhancing joint and fascial mobility. Current evidence also suggests that the analgesic effects of manual therapy are mediated not only through mechanical changes but also through neurophysiological mechanisms, including modulation of nociceptive processing, activation of descending inhibitory pathways, and reduced protective muscle guarding. These mechanisms may explain the improvement in pain observed in the Manual Therapy group.
- Although Manual Therapy produced clinically relevant pain reduction, Dry Needling demonstrated a substantially greater improvement in pain intensity. Participants treated with Dry Needling exhibited a larger reduction in VAS scores, indicating superior short-term analgesic effectiveness. This finding may be explained by the physiological mechanisms associated with trigger point dry needling. Needle insertion into myofascial trigger points is believed to disrupt abnormal motor end-plate activity, reduce spontaneous electrical activity, and elicit local twitch responses that contribute to normalisation of muscle tone. In addition, Dry Needling has

been associated with activation of endogenous opioid mechanisms, modulation of central pain pathways, improved local circulation, and reduction of peripheral nociceptive input. Together, these responses may produce greater pain relief than manual soft tissue techniques alone.

- Athletes with ITBS frequently present with myofascial trigger points involving the tensor fasciae latae, gluteus maximus, gluteus medius, and vastus lateralis muscles. Persistent trigger point activity within these muscles may increase mechanical loading on the iliotibial band, contribute to pain sensitisation, and impair movement efficiency. By directly targeting these hyperirritable points, Dry Needling may reduce local muscle tension and improve tolerance to therapeutic exercise. The greater pain reduction observed in the present study supports the clinical value of integrating Dry Needling into comprehensive rehabilitation programmes for athletes with ITBS.
- The findings of the present study are consistent with previous literature reporting favourable outcomes following Dry Needling for myofascial pain conditions and lower-extremity overuse injuries. Studies comparing Dry Needling with other conservative interventions have demonstrated greater reductions in pain intensity and improved patient-reported outcomes, particularly when Dry Needling is incorporated into a structured rehabilitation programme. Similarly, previous reviews have reported beneficial effects of Manual Therapy for reducing pain and improving mobility in individuals with ITBS, although the magnitude of improvement appears to vary depending on treatment techniques, intervention duration, and patient characteristics. The present findings add to this evidence by directly comparing two commonly used physiotherapy interventions under identical exercise conditions.
- An important strength of this study is that both intervention groups completed the same structured exercise programme. Consequently, the observed differences in pain outcomes are more likely to reflect the additional effects of Dry Needling and Manual Therapy rather than differences in exercise prescription. This design improves the clinical applicability of the findings because exercise-based rehabilitation represents standard conservative management for athletes with ITBS.

- From a clinical perspective, early reduction of pain is particularly important in athletic populations because persistent pain often limits training participation, delays progression of strengthening exercises, and prolongs return to sport. The greater pain relief achieved with Dry Needling may enable athletes to tolerate higher rehabilitation loads, perform strengthening exercises more effectively, and progress more confidently through sport-specific rehabilitation. Therefore, Dry Needling may be considered a valuable adjunctive intervention during the early phases of conservative management when rapid pain reduction is a primary treatment objective.
- Despite these encouraging findings, certain limitations should be considered. The study included a relatively modest sample size recruited from a single centre, which may limit generalisability to broader athletic populations. Pain outcomes were evaluated over a six-week intervention period without long-term follow-up; therefore, the durability of treatment effects beyond the intervention period remains uncertain. Additionally, participant blinding was not feasible because of the nature of the interventions, introducing the possibility of performance and expectation bias. Future multicentre trials with larger samples, longer follow-up periods, and additional objective biomechanical outcome measures are recommended to confirm these findings and establish the long-term effectiveness of Dry Needling in the management of ITBS.
- Overall, the results indicate that although both Manual Therapy and Dry Needling are effective adjuncts to structured exercise-based rehabilitation, Dry Needling provides superior short-term pain relief in athletes with Iliotibial Band Syndrome. These findings support its inclusion as part of evidence-informed physiotherapy practice when pain reduction is the primary clinical objective.

CONCLUSION

The present study compared the effectiveness of Manual Therapy and Dry Needling, each combined with a structured exercise programme, in reducing pain among athletes diagnosed with Iliotibial Band Syndrome. Both intervention protocols produced statistically significant reductions in pain following six weeks of supervised rehabilitation. However, participants treated with Dry Needling combined with the structured exercise

programme demonstrated significantly greater improvement in pain intensity than those receiving Manual Therapy with the same exercise programme.

These findings suggest that although both interventions are effective components of conservative physiotherapy management, Dry Needling provides superior short-term analgesic benefits when incorporated into a structured rehabilitation programme. Early pain reduction may facilitate greater participation in therapeutic exercise, improve treatment compliance, and support progression toward higher functional activities during rehabilitation.

Therefore, Dry Needling may be considered the preferred adjunctive intervention for reducing pain in athletes with Iliotibial Band Syndrome undergoing exercise-based rehabilitation.

Clinical Implications

The findings of this study have important implications for sports physiotherapy practice.

- Dry Needling can be incorporated as an adjunct to structured exercise programmes to achieve faster pain reduction in athletes with Iliotibial Band Syndrome.
- Earlier pain relief may improve patient participation in strengthening and neuromuscular rehabilitation programmes.
- Manual Therapy remains an effective conservative treatment option, particularly for patients in whom Dry Needling is contraindicated or not preferred.
- Individualized rehabilitation combining evidence-based exercise with appropriate adjunctive interventions may optimize clinical outcomes and facilitate earlier return to sports participation.

Strengths of the Study

The present investigation has several strengths.

- A prospective comparative interventional design was employed.

- Both intervention groups followed an identical structured exercise programme, minimizing rehabilitation-related confounding.
- Standardized outcome assessment using the Visual Analogue Scale enhanced the reliability of pain measurement.
- Equal sample allocation between intervention groups improved comparability.
- The study directly compared two commonly used physiotherapy interventions in an athletic population, addressing an important gap in the existing literature.
- incorporation of biomechanical, electromyographic, and movement-analysis outcomes;
- evaluation of return-to-sport timelines following different physiotherapy interventions;
- comparison of Dry Needling with other contemporary conservative interventions, including shockwave therapy, instrument-assisted soft tissue mobilization, and blood flow restriction training.

Limitations

The study should be interpreted considering several limitations.

- The sample size was relatively modest and recruited from a single institution.
- Long-term follow-up was not performed; therefore, maintenance of treatment effects remains unknown.
- Participant and therapist blinding was not feasible because of the nature of the interventions.
- Pain was assessed using a patient-reported outcome measure without objective biomechanical or imaging assessments.
- The findings may not be generalizable to non-athletic populations or individuals with chronic recurrent ITBS.

Recommendations for Future Research

Future investigations should consider:

- multicentre randomized controlled trials involving larger sample sizes;
- long-term follow-up to determine the persistence of pain reduction;

Abbreviations

Abbreviation Full Form

ITBS	Iliotibial Band Syndrome
ITB	Iliotibial Band
DN	Dry Needling
MT	Manual Therapy
VAS	Visual Analogue Scale
BMI	Body Mass Index
SD	Standard Deviation
ROM	Range of Motion
TFL	Tensor Fasciae Latae
MFR	Myofascial Release
IEC	Institutional Ethics Committee

Declarations

Ethics Approval

Ethical approval for the study was obtained from the Institutional Ethics Committee of Pacific Medical University, Udaipur, Rajasthan, India. All participants provided written informed consent prior to enrolment.

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

Consent for Publication

Not applicable.

Availability of Data

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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No external funding was received for this study.

Author Contributions

Anushka Bajaj contributed to the study conception and design, participant recruitment, intervention, data collection, statistical analysis, interpretation of results, and preparation of the manuscript.

Dr. Farukh Mohammad Pinjara supervised the research, contributed to the study methodology, critically reviewed the manuscript, and approved the final version.

Dr. Jafar Khan contributed to study oversight, scientific review, and final manuscript approval.

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