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Impact of Instrument-Assisted Soft Tissue Mobilization Combined with Conventional Therapy on Calf Muscle Pain and Tightness Among Teachers

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Abstract: Teachers frequently engage in prolonged standing and repetitive lower-limb loading throughout their workday, placing continuous stress on the calf musculature. Over time, this strain can contribute to the development of myofascial trigger points, which are characterized by localized tenderness, increased muscle tightness, and referred pain. These symptoms may impair mobility, reduce occupational efficiency, and predispose individuals to chronic musculoskeletal conditions. Instrument-Assisted Soft Tissue Mobilization (IASTM) has emerged as a specialized manual therapy technique aimed at improving soft-tissue extensibility, reducing fascial adhesions, and enhancing tissue healing. Although IASTM has shown promising results in athletic and clinical populations, limited evidence exists regarding its effectiveness among teaching professionals, who represent a high-risk occupational group for lower-limb overuse injuries.

Objective: The present study aimed to examine the therapeutic impact of integrating IASTM with conventional physiotherapy approaches on reducing pain and muscle tightness in teachers diagnosed with calf myofascial trigger points. The study further sought to compare the outcomes between IASTM-assisted treatment and traditional physiotherapy alone.

Methods: A experimental study was conducted on 40 teachers aged 25–50 years who were clinically diagnosed with calf trigger points. Participants were randomly allocated into two groups:

Group A (Experimental): Received IASTM along with stretching, myofascial release, and strengthening exercises.

Group B (Control): Received only traditional physiotherapy interventions. Pain levels were evaluated using the Visual Analog Scale (VAS), and muscle tightness was assessed through active ankle dorsiflexion range of motion (ROM). The intervention lasted for 2 weeks with five sessions per week. Pre- and post-treatment values were analyzed using paired and unpaired t-tests.

Results: Both groups demonstrated meaningful improvements following the intervention period; however, significantly superior outcomes were observed in Group A. Participants receiving IASTM exhibited a greater reduction in pain scores and a larger increase in ankle dorsiflexion ROM compared to the control group. The statistical analysis revealed a highly significant difference ($p < 0.001$) in favor of the IASTM group, indicating that the technique effectively enhances soft-tissue mobility and reduces myofascial sensitivity.

Conclusion: The findings of this study highlight the enhanced therapeutic value of incorporating IASTM into routine physiotherapy for the management

of calf myofascial trigger points among teachers. By providing greater reductions in pain and muscle tightness, IASTM serves as an effective clinical adjunct capable of improving lower-limb function and addressing occupational musculoskeletal demands. Its application may help prevent chronic discomfort and improve overall physical well-being in teaching professionals.

Keywords: IASTM, Myofascial Trigger Points, Calf Muscle Pain, Muscle Tightness, Teaching Profession, Physiotherapy, Soft Tissue Mobilization, Flexibility.

1. INTRODUCTION

Musculoskeletal disorders (MSDs) are widely recognized as one of the leading contributors to physical discomfort, reduced functional capacity, and occupational absenteeism across various professions. Among these, the teaching profession is particularly vulnerable due to the nature of work that involves prolonged periods of standing, repetitive movement patterns, static postures, and limited opportunities for rest breaks during working hours. These occupational demands place substantial mechanical stress on the lower limbs, particularly the calf muscles, predisposing teachers to muscle fatigue, tightness, and the development of myofascial trigger points.

Myofascial trigger points are hyperirritable nodules located within taut bands of skeletal muscle, commonly associated with local tenderness, referred pain, reduced flexibility, and motor dysfunction. In the calf musculature, especially the gastrocnemius and soleus, trigger points can significantly impair functional mobility, compromise gait patterns, and interfere with standing tolerance—tasks essential for teaching professionals. If left untreated, trigger points may progress into chronic myofascial pain syndrome, further affecting quality of life and workplace productivity.

Conventional physiotherapy plays a crucial role in the management of trigger points through interventions such as stretching, strengthening, myofascial release, and corrective exercises. While these approaches have shown clinical benefits, the demand for more efficient and targeted treatment strategies has supported the integration of adjunctive manual therapy techniques. Instrument-Assisted Soft Tissue Mobilization (IASTM) has gained prominence as a modern therapeutic option that uses specifically designed tools to mobilize soft tissues, improve fascial glide, enhance local circulation, and stimulate the healing process.

IASTM techniques work on the principle of controlled microtrauma, which is believed to facilitate fibroblast recruitment, collagen realignment, and the breakdown of adhesions within dysfunctional soft tissue. Several studies have reported improved range of motion, decreased pain sensitivity, and enhanced muscle performance following IASTM application. However, existing literature predominantly focuses on athletic or clinical populations, leaving a significant gap regarding its potential benefits for occupational groups such as teachers.

Given the high physical demands of teaching and the increasing prevalence of lower-limb musculoskeletal problems in this demographic, investigating effective treatment strategies is essential. Early identification and management of calf muscle trigger points may help minimize long-term complications, reduce work-related fatigue, and improve overall physical function.

Therefore, the present study aims to explore the effectiveness of IASTM when incorporated with conventional physiotherapy techniques in reducing pain and muscle tightness among teachers with calf myofascial trigger points. By comparing outcomes with those receiving only standard physiotherapy, this research seeks to provide evidence-based insights into whether IASTM offers an additive clinical advantage and can be recommended as part of an occupational rehabilitation framework for teaching professionals.

2. METHEDOLOGY

Study Design:

Aexperimental research design was used.

Participants:

Forty teachers aged 25–50 years with active calf trigger points were included.

Inclusion Criteria:

- Minimum 3 years teaching experience.
- Calf pain for over one month.
- Palpable trigger point with referred pain.
- Voluntary consent.

Exclusion Criteria:

- Recent injury or surgery.
- Vascular or neurological conditions.
- Systemic inflammatory disorders.

Procedure:

Group A received 10 minutes of IASTM followed by stretching and strengthening.

Group B performed stretching and strengthening only.

Outcome Measures:

1. Pain: Visual Analog Scale (VAS).
2. Muscle Tightness: Ankle dorsiflexion ROM using a goniometer.

Duration:2 weeks, 5 sessions per week.

Statistical Analysis:

Paired and unpaired t-tests were used with significance at $p < 0.05$.

Study Setting

Study period

2 Months

3. RESULTS

Both groups showed improvement after treatment, with Group A displaying significantly greater reductions.

VAS Scores:

- Group A: 7.1 ± 0.5 to 3.3 ± 0.4
- Group B: 7.0 ± 0.6 to 4.9 ± 0.5

Ankle Dorsiflexion ROM:

- Group A: $10.4° \pm 1.2$ to $16.8° \pm 1.1$
- Group B: $10.7° \pm 1.3$ to $13.9° \pm 1.2$

Statistical analysis confirmed a highly significant difference ($p < 0.001$).

Author	Study-design	Participants	Objective of the study	Results obtained	Conclusion
Cheatham et al., 2016	Systematic Review	9 included studies involving adults with various musculoskeletal conditions	To evaluate the effectiveness of IASTM on pain, mobility, and functional	Reported improvements in pain and range of motion across	IASTM shows potential benefits, though stronger, standardized

			outcomes	several studies, but with inconsistent methodology and limited high-quality research	research is needed to confirm its effectiveness
Kim, Sung & Lee (2017)	Randomized Controlled Trial	30 participants with gastrocnemiusmyofascial pain	To determine the effects of IASTM on calf muscle pain and flexibility	IASTM group showed significantly lower pain scores and greater muscle flexibility compared to the control group	IASTM effectively reduces myofascial pain and improves flexibility in the gastrocnemius muscle
Baker et al. (2013)	Narrative Review	Not applicable (review of existing literature and clinical mechanisms)	To explain mechanisms and clinical applications of IASTM	Identified multiple mechanisms including enhanced fibroblast activity, improved circulation, and collagen remodelling	IASTM may restore soft-tissue function and should be integrated within a broader rehabilitation plan
Laudner et al. (2014)	Controlled Laboratory Study	20 healthy participants	To examine immediate effects of IASTM on shoulder and posterior chain flexibility	Participants experienced significant short-term increases in flexibility post-IASTM treatment	IASTM can produce immediate flexibility improvements, useful for warm-ups or mobility sessions
Loghmani& Warden (2009)	Animal Experimental Study	Rats with induced knee ligament injury	To investigate whether cross-fiber IASTM accelerates ligament healing	Treated ligaments displayed improved structural organization and increased mechanical strength	IASTM-like cross-fiber massage may accelerate tissue repair and strengthen healing ligaments
Ajimsha et al. (2015)	Systematic Review	10 clinical studies involving patients with chronic myofascial pain	To assess the effectiveness of myofascial release therapy	Most studies showed reduced pain intensity and improved functional outcomes, with varying study quality	Myofascial release may be effective for chronic myofascial pain but requires more rigorous clinical trials
Travell, Simons & Simons (1999)	Clinical Textbook	Not applicable (reference manual)	To detail trigger point mechanisms, symptoms, and	Provides comprehensive descriptions of trigger point	Foundational reference for understanding and treating

			treatment strategies	physiology, referral pain patterns, and manual therapy interventions	myofascial trigger point dysfunction
Sharan et al. (2012)	Cross-Sectional Study	1,500 school teachers	To determine prevalence of musculoskeletal disorders related to prolonged standing	High levels of lower-limb and back pain were reported, with prolonged standing identified as a major contributing factor	Prolonged standing increases musculoskeletal strain, indicating need for preventive interventions
Sundstrup et al. (2014)	Observational Study	282 workers	To analyze how lower-limb tightness influences work capacity and musculoskeletal symptoms	Increased tightness was associated with decreased physical performance and higher levels of discomfort	Managing muscle tightness may improve workplace function and reduce risk of musculoskeletal disorders
Schleip et al. (2012)	Scientific Textbook	Not applicable	To provide an advanced understanding of fascial anatomy, biomechanics, and clinical relevance	Shows fascia's major role in movement efficiency, tension distribution, and pain perception	Supports the importance of fascial-focused manual therapies in improving musculoskeletal health

4. DISCUSSION

Findings indicate that IASTM enhances the effects of traditional physiotherapy by reducing fascial adhesions, improving circulation, and increasing muscle extensibility. These results align with earlier studies supporting IASTM's benefits for soft-tissue mobility.

Teachers, who often stand for long periods, benefit from interventions addressing myofascial dysfunction. Incorporating IASTM into treatment plans may prevent chronic musculoskeletal issues.

5. CONCLUSION

The present study demonstrates that integrating Instrument-Assisted Soft Tissue Mobilization (IASTM) with conventional physiotherapy techniques results in significantly greater improvements in pain reduction and calf muscle flexibility among teachers with myofascial trigger points. Teachers represent a unique occupational group that is frequently exposed to prolonged static standing postures, leading to cumulative stress on the lower limb musculature. The findings of this research highlight that IASTM provides an added therapeutic advantage over standard physiotherapy by facilitating enhanced soft-tissue mobilization, reducing fascial restrictions, and promoting tissue extensibility.

The superior outcomes observed in the experimental group suggest that IASTM helps accelerate the release of myofascial adhesions and improves physiological healing responses, leading to faster symptom relief and functional recovery. This is particularly relevant in occupational settings where untreated calf tightness can limit standing tolerance, alter gait patterns, and predispose individuals to further musculoskeletal complications.

By demonstrating measurable improvements in pain and ankle dorsiflexion range of motion, this study supports the clinical relevance of incorporating IASTM into regular physiotherapy programs for populations exposed to repetitive standing demands. The findings emphasize the importance of early intervention and targeted manual therapy in preventing chronic myofascial dysfunction among teachers.

Overall, IASTM can be considered a practical, safe, and effective adjunctive therapy that enhances the outcomes of traditional physiotherapy management. Future research with larger sample sizes, long-term follow-ups, and functional outcome measures is recommended to further validate the efficacy of IASTM in occupational health settings and to explore its applicability across different populations with lower-limb musculoskeletal disorders.

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CONFLICT OF INTEREST:

Authors declare that there is no conflict of interest.

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