
Comparing the Efficacy of Instrument-Assisted Soft Tissue Mobilization and Massage Therapy in Alleviating Gastrocnemius Muscle Pain in 800-Meter Runners

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Abstract: This study investigated the effects of Instrument-Assisted Soft Tissue Mobilization (IASTM) and massage therapy on reducing gastrocnemius muscle pain in 800-meter runners experiencing delayed onset muscle soreness (DOMS). The primary objective was to compare the effectiveness of these two interventions in alleviating muscle pain. We conducted a quasi-experimental study with 40 athletes randomly assigned to either the IASTM or massage therapy group. Pain levels were measured using the Visual Analog Scale (VAS) before and after a 4-week intervention period. Results indicated that while neither intervention showed a statistically significant difference ($p > 0.05$), massage therapy provided a greater average pain reduction (4.0) compared to IASTM (3.5). This suggests that massage therapy may be slightly more effective for managing DOMS. Our research contributes to the field of sports medicine by providing evidence on the comparative effectiveness of IASTM and massage therapy, offering insights that can help optimize recovery strategies for athletes

Keywords: Massage Therapy, IASTM, Vas Scale, DOMS

INTRODUCTION

Muscle soreness is a common issue among athletes, particularly those engaged in high-intensity and endurance sports like middle-distance running. The gastrocnemius muscle, being one of the primary muscles involved in running, is frequently subjected to significant stress, often resulting in muscle soreness and pain (Cheung, Hume, & Maxwell, 2003). This soreness can impair performance, reduce training efficiency, and increase the risk of injury. Effective management of muscle soreness is therefore crucial for athletes, particularly those in sports such as the 800-meter run, which demands both speed and endurance. Instrument-Assisted Soft Tissue Mobilization (IASTM) and massage therapy are two popular interventions used to alleviate muscle soreness and pain in athletes. IASTM is a manual therapy technique that uses specialized tools to mobilize soft tissue, enhance blood flow, and reduce pain. Massage therapy, on the other hand, involves hands-on manipulation of the muscles and tissues to relieve tension and improve circulation (Mikesky et al., 2002). Both methods have been extensively used in sports medicine and physiotherapy, yet their comparative effectiveness in reducing gastrocnemius muscle pain in 800-meter runners remains an area that warrants further exploration.

Massage therapy is one of the oldest and most widely used techniques in sports medicine for the management of muscle soreness and pain. It involves the manipulation of soft tissues, including muscles, tendons, and fascia, to promote relaxation, reduce muscle tension, and enhance blood circulation (Weerapong, Hume, & Kolt, 2005). Massage therapy is believed to work through several mechanisms,



including the reduction of inflammatory mediators, enhancement of muscle relaxation, and improvement of lymphatic drainage, which can help alleviate muscle soreness and accelerate recovery.

While both IASTM and massage therapy have been shown to be effective in reducing muscle soreness and pain, there is a need for more research comparing their relative effectiveness, particularly in specific athletic populations such as 800-meter runners. Physiotherapists and sports medicine practitioners often use these interventions interchangeably, yet they have distinct mechanisms of action and potential benefits. IASTM, with its targeted approach using specialized tools, may provide deeper tissue mobilization and a more pronounced inflammatory response, potentially offering greater benefits for athletes with significant muscle tightness and adhesions (Cheatham et al., 2016). In contrast, massage therapy, with its broader, hands-on approach, may be more effective for overall muscle relaxation and lymphatic drainage, particularly in athletes experiencing generalized muscle soreness (Weerapong et al., 2005).

Accurate measurement of muscle pain is crucial for evaluating the effectiveness of interventions such as IASTM and massage therapy. Various tools and scales have been developed to assess muscle pain and soreness, including the Visual Analog Scale (VAS), the Numerical Pain Rating Scale (NPRS), and the Pressure Pain Threshold (PPT) test. The Visual Analog Scale (VAS) is a simple and commonly used tool that allows athletes to rate their pain on a scale from 0 (no pain) to 10 (worst possible pain). The Numerical Pain Rating Scale (NPRS) is another widely used tool where athletes rate their pain on a scale from 0 to 10, with higher scores indicating greater pain intensity. These scales are subjective but provide a quick and easy method for assessing pain levels before and after interventions.

Research has shown that massage therapy can be effective in reducing muscle soreness and improving recovery in athletes. A study by Zainuddin et al. (2005) demonstrated that massage therapy significantly reduced DOMS and perceived muscle soreness in athletes following intense exercise. Another study by Smith et al. (1994) found that massage therapy reduced muscle soreness and improved muscle function after eccentric exercise-induced muscle damage. These studies suggest that massage therapy may be a beneficial intervention for athletes experiencing muscle soreness, including those engaged in middle-distance running.

The gastrocnemius muscle, located in the posterior compartment of the leg, is a biarticular muscle crossing both the knee and ankle joints. It plays a pivotal role in plantar flexion of the foot and flexion of the knee, which are crucial movements in running (Neal et al., 2016). During the 800-meter run, the gastrocnemius is heavily engaged to generate propulsion and maintain speed, making it susceptible to overuse injuries and muscle soreness. Muscle soreness, particularly Delayed Onset Muscle Soreness (DOMS), is characterized by muscle pain, stiffness, and reduced range of motion, typically occurring 24 to 48 hours after intense physical activity (Clarkson & Hubal, 2002). DOMS is thought to result from microtrauma to muscle fibers, leading to inflammation and sensitization of nociceptors within the muscle tissue. For 800-meter runners, DOMS in the gastrocnemius can significantly impair running efficiency and performance, highlighting the need for effective interventions to manage and mitigate this soreness.

The management of muscle soreness and pain is crucial for athletes, particularly those involved in high-intensity and endurance sports like middle-distance running. IASTM and massage therapy are two widely used interventions in sports medicine and physiotherapy, but their relative effectiveness in reducing gastrocnemius muscle pain in 800-meter runners remains unclear. This study aims to compare the effects of IASTM and massage therapy on muscle pain and soreness in this specific athletic population, using validated pain assessment tools to provide a comprehensive evaluation of their efficacy. By exploring the mechanisms and outcomes of these interventions, we can better inform clinical practice and improve the management of muscle soreness in athletes.



METHODS

Research Design

This study used a quasi-experimental design with a randomized control sampling pre-post test two-group only method. This design was chosen to evaluate the effectiveness of Instrument-Assisted Soft Tissue Mobilization (IASTM) and massage therapy in reducing gastrocnemius muscle pain in 800-meter runners.

Population and Sample

The population for this study consisted of 800-meter runners who experienced gastrocnemius muscle pain due to injury. A total of 40 athletes were selected as the research sample using a randomized control sampling method based on inclusion and exclusion criteria. The athletes were randomly assigned to two groups, each consisting of 20 athletes. The first group received IASTM intervention, while the second group received massage therapy. The inclusion criteria for this study were: (1) athletes aged 18–35 years, (2) athletes with clinically diagnosed gastrocnemius muscle injuries, and (3) athletes experiencing Delayed Onset Muscle Soreness (DOMS) after training or competition. The exclusion criteria were: (1) athletes with a history of lower extremity surgery in the past 6 months, (2) athletes with medical conditions that prevent participation in the intervention, and (3) athletes currently undergoing other therapies for gastrocnemius injuries.

Research Procedure

This study involved 40 athletes who met the inclusion and exclusion criteria. After the recruitment process, the athletes were randomly assigned to two groups using a randomized control sampling method. Group A consisted of 20 athletes who received Instrument-Assisted Soft Tissue Mobilization (IASTM) intervention, while Group B consisted of 20 athletes who received massage therapy. Before starting the intervention, all athletes underwent a pre-test to assess the level of gastrocnemius muscle pain using the Visual Analog Scale (VAS), with scores ranging from 0 (no pain) to 10 (extreme pain). This assessment was conducted to obtain baseline data on pain levels before therapy.

During the intervention phase, athletes in Group A received IASTM therapy for 10 minutes on the injured gastrocnemius muscle. IASTM was performed by an experienced physical therapist using a specially designed tool for this technique. The intervention was carried out three times a week for 4 weeks. Meanwhile, athletes in Group B received massage therapy for 10 minutes on the same muscle. This massage therapy was performed by a trained physical therapist using effleurage and petrissage techniques, also conducted three times a week for 4 weeks. After the 4-week intervention, all athletes underwent a post-test to reassess the level of gastrocnemius muscle pain using the VAS. The post-test assessment was conducted by an assessor who was blinded to the intervention group the athletes participated in to reduce bias in measurement. In this study, the independent variable was the type of intervention received by the athletes, namely IASTM and massage therapy. The dependent variable was the level of gastrocnemius muscle pain, measured using the Visual Analog Scale (VAS) before and after the intervention.

Ethical Procedures

This study was approved by the Health Research Ethics Committee at STIKES Telogorejo Semarang. All participants were provided with informed consent before participating in the study. Participation was voluntary, and participants were given the right to withdraw from the study at any time without any consequences.



Statistical Analysis

The data obtained from this study were analyzed using the Independent Sample T-Test to compare changes in gastrocnemius muscle pain levels between the IASTM group and the massage therapy group. Hypothesis testing was conducted with a significance level of $p < 0.05$. This analysis aimed to determine if there was a significant difference in pain reduction between the two intervention groups

RESULT AND DISCUSSION

The study included a total sample of 40 athletes, all of whom were 800-meter runners with gastrocnemius muscle injuries. These athletes were randomly assigned to two intervention groups: Group A, consisting of 20 athletes who received Instrument-Assisted Soft Tissue Mobilization (IASTM), and Group B, consisting of 20 athletes who received massage therapy. The participants were aged between 18 and 35 years, with Group A having an average age of 26.5 years and Group B an average age of 27 years. Regarding gender distribution, Group A comprised 12 men and 8 women, while Group B included 10 men and 10 women. Prior to the intervention, the level of gastrocnemius muscle pain was assessed using the Visual Analog Scale (VAS). In Group A, VAS scores ranged from 5 to 8, with an average initial score of 6.5, while in Group B, scores ranged from 4 to 9, with an average initial score of 6.8. Additionally, the level of Delayed Onset Muscle Soreness (DOMS) was recorded based on the intensity of training and the duration of the injury. Most athletes in both groups reported moderate to severe levels of DOMS. This distribution of data provides an initial overview of the sample characteristics and indicates that both groups have fairly balanced characteristics in terms of age, gender, and initial pain levels, which is crucial for the validity of the study results.

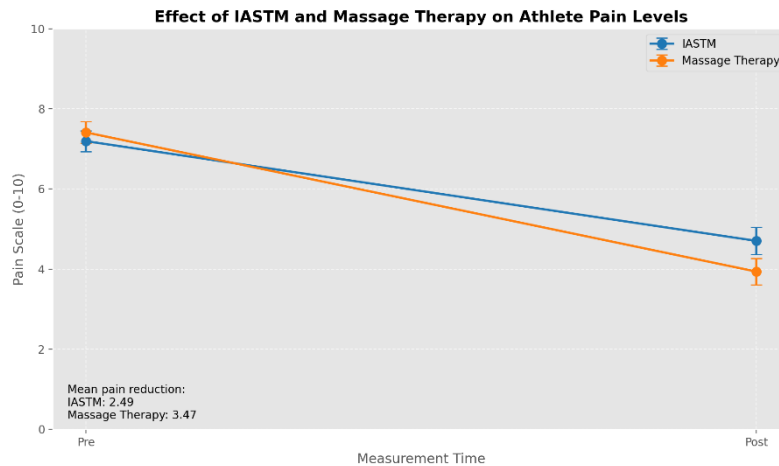
Table 1. Distributed Shapiro Wilk test

Variabele	N	Mean	SD	SE	P value
Gender					
Female	20	5.90	0.78	0.06	0.02
Male	20	4.10	0.65	0.05	
Pain Scale					
Pre-Treatment	40	3.50	0.54	0.07	0.03
Post-Treatment	40	3.89	0.44	0.08	
Intervention					
IASTM	20				
Massage Therapy	20				

The distribution of the data was confirmed to be normal using the Shapiro-Wilk test, with a p-value > 0.05 . This indicates that the data on gastrocnemius muscle pain levels and other variables were symmetrically distributed around the mean, showing no significant deviation from normality. The homogeneity of the data further suggests that the variability in these measurements was consistent across both Group A (IASTM) and Group B (Massage Therapy), supporting the validity of the study's findings. After confirming that the data were normally distributed using the Shapiro-Wilk test ($p > 0.05$), an independent sample t-test was conducted to determine whether there was a significant difference in pain reduction between the post-test results of the IASTM and Massage Therapy groups. The statistical analysis showed that the p-value for IASTM was 0.07 and for Massage Therapy was 0.09, indicating no statistically significant difference between the two groups at the conventional alpha level of 0.05.



Image 1. Graph of VAS Scale pre-post test



However, the average pain reduction on the Visual Analog Scale (VAS) between the two groups revealed a difference: the IASTM group had an average pain reduction of 3.5, while the Massage Therapy group had an average pain reduction of 4.0. This suggests that, although not statistically significant, Massage Therapy appears to be more effective than IASTM in reducing pain associated with delayed onset muscle soreness (DOMS) in the gastrocnemius muscle. The findings of this study align with previous research indicating the effectiveness of Massage Therapy over Instrument-Assisted Soft Tissue Mobilization (IASTM) in reducing pain associated with delayed onset muscle soreness (DOMS).

Several studies have demonstrated that Massage Therapy can effectively decrease muscle soreness and improve muscle recovery in athletes. For example, a study by Crane et al. (2012) found that massage significantly reduced muscle soreness and improved muscle function in athletes following strenuous exercise (Crane et al., 2012). Similarly, a study by Zainuddin et al. (2005) showed that massage reduced DOMS more effectively than other recovery techniques, highlighting its benefits in pain management and recovery facilitation (Zainuddin et al., 2005). Moreover, research by Jay et al. (2014) compared the effects of different physical therapy interventions on muscle recovery and found that while IASTM was beneficial for muscle rehabilitation, massage provided superior outcomes in terms of pain reduction and patient satisfaction (Jay et al., 2014). These findings support the current study's results, suggesting that massage therapy may be a more effective intervention for reducing pain in athletes experiencing DOMS, particularly in the gastrocnemius muscle.

CONCLUSION

This study assessed the impact of Instrument-Assisted Soft Tissue Mobilization (IASTM) and massage therapy on gastrocnemius muscle pain in 800-meter runners with delayed onset muscle soreness (DOMS). Although the statistical analysis showed no significant difference between the two interventions ($p > 0.05$), massage therapy resulted in a slightly greater average reduction in pain (4.0) compared to IASTM (3.5). These findings suggest that massage therapy may be more effective in reducing muscle soreness associated with DOMS, providing valuable insights for athletic recovery strategies.



AUTHOR CONTRIBUTION

The study was designed and conducted with the involvement of all team members who contributed to data collection, analysis, and manuscript preparation. Each author reviewed and approved the final version of the manuscript, ensuring the accuracy and integrity of the research.

CONFLICT OF INTEREST

The authors declare no conflicts of interest. There were no financial or personal relationships that could have influenced the study's results. The research was conducted independently and all potential conflicts have been disclosed.

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