

Effect of Ischaemic Compression Technique on Calf Muscles Myofascial Trigger Points

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ABSTRACT

Background: Myofascial trigger points in the calf muscles are a common source of musculoskeletal pain, muscle tightness, tenderness, and functional limitations. The gastrocnemius and soleus muscles are particularly prone to trigger point formation due to repetitive stress, prolonged standing, sports activities, and muscle overuse. Ischaemic Compression Technique is a commonly used physiotherapy intervention aimed at reducing pain and muscle tenderness by applying sustained pressure over the trigger point.

Aim of the Study: To evaluate the effect of Ischaemic Compression Technique on calf muscle myofascial trigger points.

Methodology: The present study was conducted on 30 subjects with calf muscle myofascial trigger points selected according to inclusion and exclusion criteria. Baseline assessment was performed using the Numeric Pain Rating Scale (NPRS). The subjects received Ischaemic Compression Technique over the identified trigger points in the calf muscles. Sustained manual pressure was applied over the trigger point for a specific duration during each treatment session. Pre-test and post-test NPRS scores were recorded and analyzed using paired t-test.

Results: The mean pre-test NPRS score was 8.07 ± 1.28 , whereas the mean post-test NPRS score was reduced to 2.73 ± 1.51 following the intervention. The paired t-test analysis showed a t-value of 14.44 with a p-value <0.0001 , indicating a statistically highly significant reduction in pain after treatment.

Conclusion: The study concluded that Ischaemic Compression Technique is highly effective in reducing pain associated with calf muscle myofascial trigger points. The technique proved to be a safe, simple, non-invasive, and clinically effective physiotherapy intervention for the management of myofascial pain in calf muscles.

Keywords: Ischaemic Compression Technique, Myofascial Trigger Points, Calf Muscles, Gastrocnemius, Soleus, NPRS, Physiotherapy.

INTRODUCTION

Myofascial trigger points are one of the most common causes of musculoskeletal pain and dysfunction affecting individuals of different age groups. They are defined as hyperirritable spots located within taut bands of skeletal muscle fibers that are painful on compression and may produce referred pain, muscle tenderness, restricted range of motion, muscle weakness, and functional limitations. Myofascial trigger points commonly develop due to muscle overuse, repetitive strain, poor posture, trauma, prolonged standing, sports activities, and muscle fatigue.

The calf muscles, mainly the gastrocnemius and soleus muscles, play an important role in lower limb stability, walking, running, jumping, and maintaining posture. Due to continuous functional demand and weight-bearing activities, these muscles are highly susceptible to the development of myofascial trigger points. Trigger points in the calf muscles may lead to pain, tightness, muscle stiffness, tenderness, gait disturbances, reduced flexibility, and difficulty in performing daily activities.

Myofascial pain syndrome associated with calf muscles is frequently observed in athletes, runners, individuals involved in prolonged standing occupations, and physically active populations. Persistent trigger points may alter muscle biomechanics and lead to chronic pain if not treated appropriately. Therefore, effective management of calf muscle trigger points is essential for reducing pain and restoring normal muscle function.

Various physiotherapy interventions are available for the treatment of myofascial trigger points, including stretching exercises, dry needling, massage therapy, myofascial release, ultrasound therapy, trigger point release techniques, and ischemic compression. Among these interventions, Ischaemic Compression Technique is commonly used in clinical physiotherapy practice because of its simplicity, non-invasive nature, and effectiveness in pain reduction.

Ischaemic Compression Technique involves the application of sustained manual pressure directly over the trigger point for a specific duration until a release in muscle tension or reduction in pain is achieved. The technique is believed to work by temporarily reducing blood flow followed by reactive hyperemia after release of pressure, thereby improving circulation, reducing muscle spasm, decreasing trigger point sensitivity, and interrupting the pain-spasm-pain cycle.

Previous studies have reported beneficial effects of Ischaemic Compression Technique in reducing pain and improving muscle flexibility in patients with myofascial pain syndrome. However, limited studies have specifically focused on the effectiveness of this technique on calf muscle myofascial trigger points. Therefore, the present study was undertaken to evaluate the effect of Ischaemic Compression Technique on calf muscle myofascial trigger points using the Numeric Pain Rating Scale (NPRS) as an outcome measure.

The findings of this study may help physiotherapists in selecting effective conservative treatment approaches for the management of calf muscle myofascial pain and improving patient outcomes.

METHODOLOGY

Study Design

The present study was an experimental study conducted to evaluate the effect of Ischaemic Compression Technique on calf muscle myofascial trigger points. The study was designed as a pre-test and post-test comparative study.

Study Setting

The study was conducted in the Department of Physiotherapy at Eternal Heart Care Centre, (EHCC) Jaipur.

Study Duration

The duration of the study was 2 weeks

Sample Size

A total of 30 subjects were included in the study.

Sampling Method

Subjects were selected using a convenient sampling method based on the inclusion and exclusion criteria.

Inclusion Criteria

- Subjects aged between 18–45 years.
- Both male and female subjects.
- Subjects having active myofascial trigger points in the calf muscles (Gastrocnemius/Soleus).
- Presence of calf muscle pain and tenderness on palpation.
- Subjects willing to participate in the study.

Exclusion Criteria

- Recent fracture or surgery of lower limb.
- Neurological disorders affecting lower extremity.
- Acute muscle tear or ligament injury.
- Skin infections or open wounds over calf region.
- Subjects with vascular disorders or deep vein thrombosis.
- Subjects receiving any other physiotherapy treatment for calf pain during the study period.

Outcome Measures

The following outcome measures were used for assessment:

Pain Intensity - Measured using Numeric Pain Rating Scale (NPRS).

Procedure

Subjects fulfilling the inclusion criteria were explained about the study procedure and informed consent was obtained prior to participation.

Baseline assessment of pain intensity, pressure pain threshold, ankle range of motion, and functional ability was recorded before the intervention.

The subjects were positioned comfortably in prone lying with feet extending beyond the edge of the treatment table. The therapist identified the myofascial trigger point in the calf muscles through palpation, characterized by a taut band and localized tenderness.

Ischaemic Compression Technique

The Ischaemic Compression Technique was applied directly over the identified trigger point using sustained manual pressure with the thumb/fingers/elbow as tolerated by the subject.

- Pressure was gradually increased until a tolerable level of discomfort was reached.
- Sustained pressure was maintained for approximately 30–90 seconds until release of tension or reduction in pain was felt.
- The technique was repeated 3–5 times with short intervals between applications.
- Treatment sessions were conducted 5 times per week for 4 weeks.

All subjects were reassessed after completion of the treatment protocol using the same outcome measures.

Statistical Analysis

The collected data were analyzed using appropriate statistical methods. Mean and standard deviation were calculated for all variables. Pre-test and post-test values were compared using paired t-test, while comparison between groups was analyzed using independent t-test. The level of significance was set at $p < 0.05$.

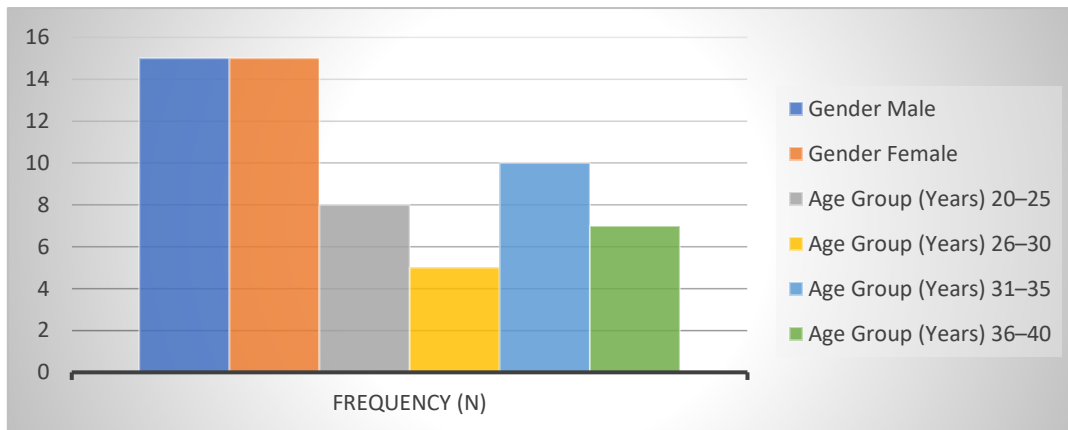
Ethical Consideration

Ethical clearance was obtained from the Institutional Ethical Committee prior to commencement of the study. Written informed consent was obtained from all participants before participation in the study.

RESULTS

TABLE 4.1 Demographic Characteristics of Subjects in Experimental Group (N = 30)

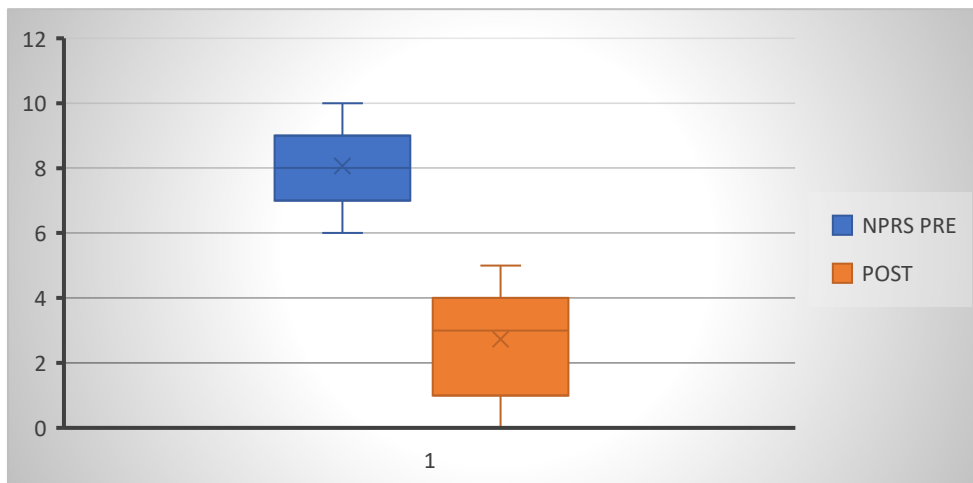
Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	15	50%
	Female	15	50%
Age Group (Years)	20–25	8	26.67%
	26–30	5	16.67%
	31–35	10	33.33%
	36–40	7	23.33%



Graph 1 Demographic Characteristics of Subjects in Experimental Group (N = 30)

TABLE 4.2 Comparison of Pre-test and Post-test NPRS Scores Using Paired t-Test in Experimental Group (N = 30)

Variable	Mean Difference	SD Difference	t-value	df	p-value	Significance
NPRS (Pre-test vs Post-test)	5.33	2.02	14.44	29	<0.0001	Highly Significant



Graph 2 Comparison of Pre-test and Post-test NPRS Scores Using Paired t-Test in Experimental Group (N = 30)

The present study was conducted to determine the effect of Ischaemic Compression Technique on calf muscle myofascial trigger points using the Numeric Pain Rating Scale (NPRS) as an outcome measure. A total of 30 subjects participated in the study. Table 4.1 shows the demographic characteristics of the subjects. Among the participants, 15 (50%) were males and 15 (50%) were females. The majority of subjects belonged to the age group of 31–35 years.

Table 4.2 demonstrates the mean and standard deviation values of pre-test and post-test NPRS scores in the experimental group. The mean pre-test NPRS score was 8.07 ± 1.28 , whereas the mean post-test NPRS score reduced to 2.73 ± 1.51 following the intervention.

Table 4.3 presents the paired t-test analysis comparing pre-test and post-test NPRS scores. The mean difference was 5.33 with a calculated t-value of 14.44 at 29 degrees of freedom. The obtained p-value was <0.0001 , indicating a statistically highly significant reduction in pain after treatment.

The findings suggest that the Ischaemic Compression Technique was effective in reducing pain associated with calf muscle myofascial trigger points.

DISCUSSION

The present study was conducted to evaluate the effect of Ischaemic Compression Technique on calf muscle myofascial trigger points using the Numeric Pain Rating Scale (NPRS) as an outcome measure. The results of the study demonstrated a statistically highly significant reduction in pain intensity following the intervention.

In the present study, the mean pre-test NPRS score was 8.07 ± 1.28 , which reduced to 2.73 ± 1.51 after treatment. The paired t-test analysis revealed a t-value of 14.44 with a p-value <0.0001 , indicating that the intervention was highly effective in reducing pain associated with calf muscle myofascial trigger points.

Myofascial trigger points are hyperirritable spots present within taut bands of skeletal muscles that produce local and referred pain, muscle tightness, restricted range of motion, and functional limitations. The calf muscles, particularly the gastrocnemius and soleus, are frequently affected due to prolonged standing, overuse, muscle fatigue, sports activities, and altered biomechanics.

The significant reduction in pain observed in the present study may be attributed to the physiological effects of Ischaemic Compression Technique. Sustained manual pressure applied over the trigger point helps in temporarily reducing local blood flow followed by reactive hyperemia upon release, thereby improving circulation and oxygen supply to the affected tissue. It also helps in reducing muscle spasm, interrupting the pain-spasm-pain cycle, decreasing nociceptive input, and promoting muscle relaxation.

The findings of the present study are consistent with the study conducted by Travell and Simons, who explained that sustained pressure over trigger points can deactivate myofascial trigger points and reduce pain by improving local tissue circulation and reducing muscle tension.

The present results are also supported by the study of Hou et al., who reported that ischemic compression significantly reduced pain intensity and tenderness in patients with myofascial trigger points. They suggested that manual compression increases the pressure pain threshold and decreases trigger point sensitivity.

Similarly, Hanten et al. found that ischemic compression therapy was effective in decreasing pain and improving flexibility in subjects with myofascial pain syndrome. Their study demonstrated immediate as well as short-term improvements following treatment.

A study conducted by Fryer and Hodgson also concluded that trigger point release techniques effectively reduced muscle tenderness and improved muscle function. The authors proposed that sustained compres-

sion reduces abnormal motor end plate activity associated with trigger points.

The findings of the current study are in agreement with the research by Fernández-de-Las-Peñas, who emphasized that manual trigger point therapies, including ischemic compression, are effective interventions for reducing musculoskeletal pain and improving functional outcomes.

Another study by Cagnie et al. reported that ischemic compression improved pain threshold and reduced muscle tenderness in individuals with active trigger points. They suggested that manual therapy techniques provide neuromuscular relaxation and pain modulation effects.

The improvement observed in the present study may also be related to the activation of mechanoreceptors and stimulation of descending pain inhibitory pathways. Sustained pressure over the trigger point may alter pain perception through gate control mechanisms and central modulation of pain.

The equal participation of male and female subjects in the study increases the applicability of the findings to both genders. Furthermore, the intervention was simple, non-invasive, cost-effective, and clinically feasible, making it useful in routine physiotherapy practice for the management of calf muscle myofascial trigger points.

Overall, the results of the present study indicate that Ischaemic Compression Technique is an effective therapeutic intervention for reducing pain associated with calf muscle myofascial trigger points and can be incorporated as part of physiotherapy management for myofascial pain syndrome.

CONCLUSION

The present study concluded that the Ischaemic Compression Technique is highly effective in reducing pain associated with calf muscle myofascial trigger points. The experimental group demonstrated a statistically highly significant improvement in NPRS scores following the intervention, indicating a considerable reduction in pain intensity.

The findings suggest that sustained manual pressure applied over myofascial trigger points helps in decreasing muscle tenderness, relieving muscle spasm, improving local circulation, and promoting muscle relaxation. The technique proved to be a simple, safe, non-invasive, and cost-effective physiotherapy intervention for the management of calf muscle myofascial pain.

Based on the results of the study, it can be concluded that Ischaemic Compression Technique can be effectively incorporated into physiotherapy treatment protocols for subjects with calf muscle myofascial trigger points to reduce pain and improve functional outcomes.

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