Effect of graston technique and cupping therapy on pain and function in individuals with medial tibial stress syndrome: a research protocol

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ABSTRACT
Medial tibial stress syndrome (MTSS) is Exertional leg discomfort. There are two forms of shin splints: anterior leg compartment dysfunction and posterior leg compartment dysfunction. MTSS patients are routinely offered graded jogging, strengthening, and stretching activities for the calf muscles. Instrument-assisted soft tissue mobilization (IASTM) includes stroking the skin with a bar or spurtle to apply repetitive mechanical stimulations to (tendons, muscle, and overlaying deep fascia) soft tissue. Cupping is a therapeutic technique that involves applying negative pressure to the skin over a sore location to relieve muscular spasms and discomfort. The rationale of the study is to find how effective the therapy for shin pain in recreational runners. The effectiveness of cupping therapy in MTSS and compares the efficacy of IASTM and cupping with strengthening and stretching exercises to see which can enhance function and reduce discomfort in a short duration of time in runners. These is randomized control trials. The study’s sample will be 46. The group B experimental group in which cupping therapy will be given, the control group, i.e., group A in which IASTM will be given for four weeks with the following baseline examinations- VAS, Treadmill test, step up and down test with MMT and ROM. The efficacy of the technique for both groups will be examined every week utilizing treadmill testing, VAS, step up and step down as end measures the pain assessment, the improvement in termination time of treadmill test as well as step up and down test.

Keywords: Dynamic Cupping, Negative pressure, Recreational Runners, Shin splints, Soft-tissue mobilization.
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INTRODUCTION
Exertional leg discomfort in runner is referred to as Medial tibial stress syndrome. Two types are anterior leg compartment dysfunction and posterior leg compartment dysfunction. It commonly occurs in the distal two-thirds of the leg, preventing exercising [1]. The source of this condition was previously unknown, and numerous possible reasons were proposed, such as increased intra-compartmental pressure or traction-induced periostitis [2]. Other names for this exercise-induced pain syndrome include shin discomfort, soleus syndrome, and MTSS [3].

Graded jogging, strengthening, and stretching activities for the calf muscles are routinely offered in this condition [2]. IASTM (Instrument-assisted soft tissue mobilization) is one way to enhance the shape of sports. It modifies the form and existing tissue nature to address fascia mobility and tissue adhesion for the tree; for rehabilitation, IASTM is an excellent approach that is suffering from repeated and cumulative injuries for athletes and non-athletes [4].

By employing these instruments, pressure is delivered to the deeper areas of the soft tissue; without mechanisms used, such as manual mobilization, instrument-assisted soft tissue mobilization is thought to generate more significant impacts on flexibility [4]. To restore mobility and reduce discomfort, clinicians familiarized several numbers of mobilizations of soft tissue procedures to treat the limitations of triceps surae [5]. Myofascial restrictions identified and for repurpose, specially developed tool, i.e., IASTM. IASTM technique, also known as Graston Method, uses six stainless-steel devices to locate, treat, and remove soft tissue limitations [6]. This therapy promotes connective tissue remodelling by resorbing excess fibrosis and stimulating collagen repair and regeneration through fibroblast recruitment [7].

Various methods generate a partial vacuum in cupping therapy via vacuum apparatus or heat. The air inside the cup is first rarefied to develop the partial almost typical common type is dry
cupping, which is used to achieve suction by flaming heating power, followed by wet cupping (which uses blood-letting on the tender point before suction), cup moves in one direction is moving to cup, removes the cups after suction immediately is flash cupping [9]. The therapeutic technique of cupping creates while applying negative pressure to the skin over a sore location relieves muscular spasms and discomfort [9]. Cupping therapy in sports medicine, also known as myofascial decompression, is used to enhance range of motion and reduce musculoskeletal pain range of motion (ROM) [10].

Static stretching exercises are used to maintain or lengthen connective tissue. The muscle's connections-bridge harness is among the non-contracile components of the muscular tendon, cross-bridge attachments, proteins within the myofibril, and the muscle's connective tissue harness [11,12]. Improvement in muscle flexibility and range of motion and passive stretching is the most common method for muscle length extension [13]. A recreational marathoner's performance and everyday activities might be hampered by injury. If the marathoner is aware of the damage and its origin, he may enhance his performance in the future by preventing that type of complication [1,14].

Strengthening the core hip muscles may also be beneficial to patients [15]. The study aims to evaluate the effectiveness of IASTM in Medial tibial stress syndrome on pain and function in runners and evaluate the effectiveness of cupping in shin splints on pain and function in runners and compare the effectiveness of IASTM and cupping in shin splints on pain and function in Runners.

METHODOLOGY

The enrolment, intervention, and assessment of this study will be followed as recommended by standard protocol item recommendation by everyday protocol items recommendation for intervention trials (SPIRIT). This randomized controlled trial will be conducted at the Department of Musculoskeletal physiotherapy, Ravi Nair Physiotherapy College, Sawangi (Meghe), Wardha, after obtaining approval from the Datta Meghe Institute of Medical Sciences' Institutional Ethics Committee (DU). The duration of the study will be March 2022-July 2023. All participants will be educated about the intervention, research, and data confidentiality before the start of the study. Before participation, participants who meet the inclusion criteria must fill out an informed consent form. Those who satisfy the criteria for inclusion will be considered for the study.

Eligibility criteria:
The inclusion criteria will comprise runners having symptoms for more than two weeks, both male and female recreational runners between 20 to 30 years of age, the pain present on the anterior and posteromedial side of the shin with local tenderness. Exclusion criteria will be fractures in the lower limb and any old surgical history around the knee and ankle. Previous bone pathology around the knee and ankle. Genu Varus or Valgus deformity, hyperextended knee deformity will also be excluded from the study, history of trauma, neurological diseases, and other metabolic, metastatic, and infective disorders.

Intervention:
The participant in the control group (Group A) received IASTM (Graston Technique). While using IASTM, a 30° to 60° angle is necessary, as well as a 40–120 second application duration. In general, four weeks of IASTM sessions were recommended. Each week 1-2 sessions were needed; however, depending on the severity of the injury and the recovery procedure, this might change. When IASTM is used in sports rehabilitation, the following six phases are usually followed: first to evaluation, second to warm-up, third to IASTM, fourth to stretching, fifth to strengthening activities, and sixth to cryotherapy. First and foremost, the current individual state must be thoroughly assessed. After that, the patient should 10-15 minutes warm-up by stationary cycling, gentle running, elliptical machine, or upper body ergometer. After the warm-up, start IASTM. Applies a cream to the individual's skin and uses a pressure that the patient can tolerate while feeling "gritty, gravelly, and sandy" in the region to be treated. Treated tissue to strengthen the collagen by strengthening, muscle strengthening, and stretching activities targeting the affected area must be undertaken after IASTM. Finally, 15–20 minutes of cryotherapy are administered. Cryotherapy can help to relieve pain and regulate any lingering inflammation in the tissue. Participants in the experimental group (GROUP B) received Dynamic Cupping [8]. Cupping treatment, also known as Dynamic cupping massage, combines regular massage motions with a suction instrument, commonly a cup, to produce negative pressure on the skin. The individual is in a long sitting position with the knee 10-20 degrees flexed. Cream or gel is applied to the treatment area, and a fibre cup is placed on the treatment region to stimulate blood flow and reduce heat and stagnation in tense, tight, or painful body parts. Identify and alleviate any adhesions found between layers of fascia using sweeping motions with the cups along the length and width of the muscles. While the individual moves that body part, a dynamic cupping cup is administered to one specific region of the treatment area. Another technique is myofascial dragging, which involves the therapist dragging or sliding the cup over a particular muscle group or location. Typically, the duration of cupping therapy varies from 15 to 25 minutes. In the acute phase, treatment can be done daily, and option conditions can be done every other day. In this study, the cupping therapy should be done for 4 weeks and 4 times a week.

Outcomes

Primary outcome measures:
1. Visual analogue scale
The severity of discomfort at rest or during movement is measured on a scale, with no pain signifying 0 and 10 denoting terrible agony. Use this outcome measure to assess pain [16]
2. Treadmill test
The participants will run on a treadmill until they feel completely exhausted in a multilevel increment test. The beginning running speed will be 6 or 8 km/h, with 2 km/h increasing every 3 minutes, depending on the athlete's known performance capability. The treadmill will have a 2% incline. The maximum level of agreement between treadmill speeds is found at this number. If the individual scores 0-4 on the VAS, the treadmill test is continued; however, if the patient scores higher than 4 on the VAS, the treadmill test is terminated. A treadmill test uses to assess the capacity where the individual terminates and to see the progression.

3. Step up and down test
   A 12-inch-high bench, a similar-sized step, a solid box, and a watch for keeping track of minutes. Single leg steps up and down test for up to individual experiencing pain and indicate the time when the patient ceases the test owing to pain. Time should be estimated by stepping up with the impacted foot and then stepping down with the same foot. A step-up-and-down test assesses the time the patient ceases the trial due to pain and progression.

Secondary outcome measures:
1. MMT and ROM

   The muscle power will be tested against the resistance by the practitioner’s lower extremity key muscle and grading the individual strength by Kendall grading 0 to 5 scales accordingly. The range of motion will be measured by using a goniometer instrument. It will help in measuring ankle dorsiflexion and plantarflexion.

Sample size:

   Regarding power calculations, the sample size determination is 46, and the sample size has been assessed to be 23 in each group. With a 90% confidence interval, each group’s minimum sample size is 23. The final sample size in the two groups is 46.

Recruitment and allocation:

   Patients who will present to the Ravi Nair Physiotherapy College and Acharya Vinoba Bhave Rural Hospital OPDs and who will be eligible for the inclusion criteria and will be willing to participate in the RCT. Sample allocation will be a random selection of patients.

Data collection:

   Pre-intervention data will be collected with the help of primary and secondary outcomes used in the study. After the treatment session starts, data will be collected using the same outcome measures. After the final data collection, arrange it in tabular format.

Statistical analysis:

   The SPSS 25 version will be utilized with a significance level of p 0.05. The descriptive and inferential statistics and the chi-square and student t-test for the difference between two means will be used in the statistical analysis.
Cupping could be a new therapeutic method for MTSS to reduce pain and improve functions in recreational runners. The comparative effect of the treatment, which includes cupping and IASTM, could be a new therapeutic method to reduce pain and early recovery in runners. It could be used later in a clinical setup once it proves effective.

**CONCLUSION:**

Conclusions will be drawn based on the effects of both therapies on the range of motion, pain, muscle strength, and functional outcomes in individuals with shin splints.

**Competing interests:**
The authors declare no competing interest.

**Authors contributions:**
All authors have contributed to the conception and drafting of the manuscript. And they have also read and agreed to the final manuscript.

**REFERENCES**


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