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Research article

Effect of theragun on calf muscle tightness in asymptomatic individuals

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ABSTRACT

Muscle tightness is commonly regarded as a risk factor for muscle damage. Calf muscle tightness has been connected to decreased ankle dorsiflexion as well as a range of ailments, including Shin splints, Achilles tendinitis, and plantar fasciitis, to name a few. Theragun is a mechanical device that is gaining steam due to its efficiency and positive benefits. Deep tissue therapy for example, of both fascia and muscle is defined by PT, which is based on the principles for the treatment of fascial connective tissues, they provide enhanced blood flow, better scar tissue, reduced pain, lower lactate, greater range of motion, and improved recovery. Given their possible influence on the tonic vibration reflex, it appears that the use of percussion instruments may support other forms of treatments. Subjects with Calf Tightness (n = 90) will be included in a single-blind RCT. The treatment will be given on the commanding foot, with 3 sittings for five minutes each. Ankle flexibility tests and Range of motion will be used to evaluate the efficacy of the technique when sessions are finished. The intent of this Research is to determine the advantages of percussion treatment in those who have calf tightness. The study's findings, which might include a novel rehabilitation approach, could help individuals with gastrocnemius muscle stiffness. Conclusion will be drawn based on the effect of the techniques on Range of Motion, Calf tightness in the asymptomatic individuals.

Keywords: Calf muscle tightness, Percussive massage technique, Rehabilitation, Physical Therapy.

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INTRODUCTION

The Calf muscle includes the gastrocnemius and Soleus muscles. The bigger muscle is found on the back of the leg, just behind the knee. The Soleus muscle is a minor muscle that lies beneath the gastrocnemius muscle in the lower thigh. These are powerful plantar flexors that connect at the ankle [1].

Muscle tightness is commonly regarded as a risk factor for muscle damage. Calf muscle tightness has been connected to decreased ankle dorsiflexion as well as a range of ailments, including Shin splints, Achilles tendinitis, and plantar fasciitis, to name a few. It has also been connected to muscle and joint sprains [2]. During the stance and terminal swing phases of walking, premature and excessive calf muscle activation has been seen, leading in ankle plantarflexion. However, such gait abnormalities are not caused largely by neurological factors. It has been demonstrated that greater triceps surae tension during stance does not correspond to increased electromyography (EMG) activity. Despite the absence of precise statistics on injury rates, straining of calves is very usual, particularly among sportsmen. The medial head of gastrocnemius is actually more prevalent area [3].

Stretching should generate time- and rate-dependent changes in these viscoelastic connective tissue parts if the stretch is long enough. Decreased ankle dorsiflexion can cause compensatory hindfoot pronation and anterior knee joint discomfort, also in healthy young people [4]. According to research on people who have been bedridden for a long period, the position that an individual assumes when sleeping may impact the contracture of these muscles. A supine posture stimulates chronic plantarflexion of the ankle, which tends to contract the triceps surae due to the weight of the bedding. A prone posture, on the other hand, requires ankle plantarflexion, which engages the posterior leg muscles [5].

A shortened muscle can result in joint imbalance and poor postural alignment, which can lead to injury and joint illness. Increased physical activity may aid in the preservation of ankle flexibility, however, aging may result in a decrease of range of motion [6]. Achilles tendinitis, gastrocnemius strains, and plantar fasciitis have all been correlated to restricted ankle dorsiflexion caused by a tight calf muscle. Many lower limb issues are associated with calf muscle rigidity and decreased ankle dorsiflexion [7,8].

Percussive Therapy is a relatively new treatment that performs massage using a mechanical instrument such as the Theragun

[9]. It is widely used in clinical practice to immediately improve ROM.

Elite athletes and endurance athletes use percussive massage guns for massage and therapy all around the world [10]. This therapy, is a soft tissue manipulation technique used to relieve muscular pain and improve range of motion [11]. It's a deep muscle therapy that uses quick and long vertical strokes to cause neuromuscular activation in the muscle.

According to its developers, these devices can send rapid, forceful, and short-term pulsating strokes deep into muscle tissues, much like a small jackhammer [12]. Stretching muscles and connective tissues, reducing soft tissue soreness, boosting blood circulation to the afflicted region, and increasing recovery and overall physical performance, they believe, are all ways they do so. In the medical literature, there are no clinical/evidence-based articles on the benefits, indications, contraindications, or negative effects of these devices [13]. As we exercise and challenge our muscles, we cause breakdown within the muscle fibers, which in turn stimulates muscle growth and regrowth, hypertrophy (increased muscle size), and strength [14]. Mechanical stimulation of a muscle [with a device like the Theragun] causes increased blood flow and the release of histamines to the stimulated area [15]. What this does is allow the increased blood flow to decrease the inflammatory response, decrease muscle soreness, and break up knots in athletes' musculature [16].

Percussion treatment and deep massage are equally helpful to lessen DOMS in a survey. They also discovered early evidence that percussive therapy might help decrease discomfort and lactate dehydrogenase accumulation in muscles after an exercise. However, as this research only included 45 women, more data is required to prove its efficacy in a broader population [17].

METHODOLOGY

This research will be conducted at Ravi Nair Physiotherapy College's Hum En research facility in Sawangi (Meghe). All participants will be told about the goals and procedures before inclusion. Patients satisfying the requirements must give permission after being fully informed before they enter the research. The participants diagnosed with tightness in calf muscles will be randomized. Allocation will be done by the primary researcher, who is an Undergraduate student in Physiotherapy. Outcome measures will be assessed before the beginning of the study and after the completion of the study, by an undergraduate student in Physiotherapy of the same experience, aware of the study and the intervention.

Participants

The inclusion criteria included either gender, between 25 and 65 years of age, those having tightness of calf muscles, the subject should not have any effect from any previous acute ankle injury and those interested in taking part in the trial and ready to take 2 weeks of medication. The exclusion criteria included those who are less than 25 years and more than 65 years of age, those with metal implants, those with a history of fracture, those who have a joint or muscular problem arising from any other condition, those who have an unstable cardiovascular condition, as determined by the physician, those who are diagnosed with the failure of lung, heart, kidney, and liver and those who are amputated limb.

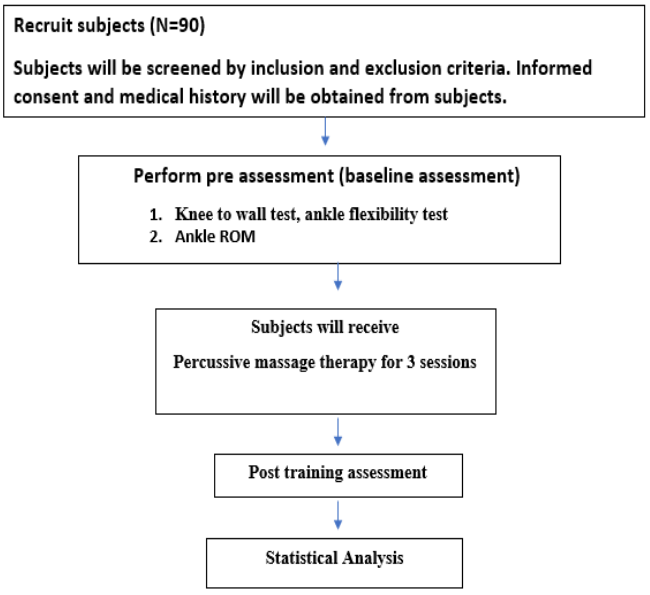
Sample size consideration

This study protocol will be independent to study the tightness and to release it by the Thera gun. The number of patients participating in the study is determined by SPSS27.0V, GraphPad Prism 7.0 software using data of chi square test, 90 patients will be enrolled in the study. Four additional participants will be recruited to maintain sample size in the event of dropout or problem with data collection. As a conservative estimate (dropout rate = 25%), we presume that 94 subjects will complete the study.

Intervention design

Prior consent of the subject will be taken before assessment, treatment will be given for 3 sessions, the Subjects will receive treatment via Theragun over the Dominant leg, patient's position: prone on the treatment table, the patient will get sessions with the flexible attachment head while the gadget creates percussions at a frequency of fifty-three Hertz, a total of 3 sessions, for five mins on the Gastrocnemius muscle of the dominant leg will be given, starting at the very medial side of the treated muscle, the massage method will be changed longitudinally in a straight line from distal to proximal and back to distal in less than 20 seconds, for each muscle, the massage will begin medially and concluded laterally. The skin will be subjected to the same amount of force [16].

Figure 1: Study flowchart



Outcome measures

The primary outcome measure includes:

Knee wall test, ankle flexibility test: Test to check if calves

are tight. Gives a good idea of how tight or short calf muscles are. The test's inter-rater reliability was R = 0.99. The measurement's intra-rater reliability was similarly high (ICC between 0.98 and 0.99) [18].

The secondary outcome measure:

ROM: The Range of Motion of ankle dorsiflexion will be calculated using a Universal Goniometer. The goniometer is a low-cost device that is widely used in clinical settings. The goniometer was zeroed by aligning with a wall perpendicular to the floor (90°) compared to the horizontal (rather than a vertical default setting) before each subject's calculation. This was done to ensure that all subjects started from the same place. By dividing the lateral malleolus and the fibular head visually the participant maintained its maximum dorsal position and a normal goniometer was aligned with the floor (stable arm) and the moving arm shaft [19].

Follow up

All participants will be followed up at 6 weeks after rehabilitation and follow-up record forms will be completed. The time of the last rehabilitation training session will be recorded. Electronic follow-up rehabilitation records will be preserved. When patients drop out of the trial, the reasons for withdrawal will be recorded in detail. Comprehensive and supportive patient communication will be undertaken; patients lost to follow-up because of any reason will be gotten in touch as soon as possible and be followed up within 6 weeks. Data regarding patients withdrawn from the trial will be included in the final analysis, according to the intention-to-treat analysis principle.

Data management

Under the supervision of the lead examiners, research will be conducted and reported. Documentation for the analysis will be carefully scrutinized for accuracy. The Excel spreadsheet will be issued to an allocation blinded statistician at the end of the study to perform the required analysis, after which the groups will be unblended. The trial's data will be stored in a safe, locked storage area with restricted access for later analysis by a biostatistician and the lead researcher. Checklists are used to avoid data from being lost due to inadequate personnel procedures.

Statistical analysis

The SPSS latest version will be used to perform statistical analyses Analysis of variance (ANOVA) will be used to compare the group effect. Individual studies will be checked for homogeneity of the two study groups using the student's t examination. To determine the impact of two steps, all statistical tests should be performed with a confidence interval of Ninety five percent (p-value 0.05). Mann-Whitney U will be used for comparing Groups at baseline.

DISCUSSION

The primary proprioceptive cells are the Muscle spindles impacting our muscles, are found in the fascia encircling the muscular and its muscle bundles rather than in the muscle itself. The surfaces underneath the skin should be able to slide and glide. It is necessary to treat if everything is glued together and does not slide and glide. Improper motor unit functioning, discomfort in the appropriate region of the joint sustaining dysfunction – even in the absence of pain may occur due to altered afferent signals to the central nervous system and that too because of fascial changes.

Vibration training may help to enhance the range of motion in the calf muscles. This may assist to alleviate stress in the muscle tendon unit, which affects the elastic features of the tissue, enhancing muscle competence and flexibility, boosting blood flow while decreasing muscular stiffness. It may reduce tissue adhesion by applying mechanical pressure to the muscular tissue. Mobilizing and stretching contracted or tenacious connective tissue can improve muscle-tendon stiffness. Muscle compliance improves, making the unit less stiff [20].

The patient with the calf muscle tightness would be seen treating with percussive massage therapy. Finally, the intention of this research is to evaluate what benefits percussive massage has on Gastrocnemius stiffness in asymptomatic people.

Conflict of interest

There are no conflicts of interest declared by the authors.

Informed consent

Before being included in the trial, all patients will give their informed permission.

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