

Effectiveness of Foam Roller based Myofascial Release in Medial Tibial Stress Syndrome among Athletic Runners

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Abstract: ***Background:** Medial Tibial Stress Syndrome is more common among athletic runners. Foam rolling (FR) is a form of self-massage in which the targeted musculature is rolled and compressed utilizing a FR device. **Objective:** To find out the effectiveness of Foam roller Based Myofascial release in Medial Tibial Stress Syndrome among athletic runners. **Methods:** Pilot study was conducted on 20 athletic runners were included under selection criteria aged between 25-40 with Medial Tibial Stress Syndrome and treated with Foam rolling and other ex's like seated shin stretch, calf stretch, Gastrocnemius stretch and calf raises for totally 5 weeks. The outcome tools used are NPRS (Numerical Pain Rating Scale) and MTSS (Medial Tibial Stress Syndrome Score). **Results:** Unpaired t test is used for group analysis. The result of the study shows that Foam roller has significant improvement in reducing Medial Tibial Stress Syndrome in athletic runners ($p < 0.0001$). **Conclusion:** This study concluded that the foam roller is more effective in reducing Medial Tibial Stress Syndrome among athletic runners.*

Keywords: Foam Roller, Medial Tibial Stress Syndrome, Seated shin stretch, Gastrocnemius and Soleus stretch

1. Introduction

Medial Tibial stress syndrome (MTSS) is defined as a debilitating pain along the posteromedial Tibial border of the lower leg. The Pain or discomfort of the legs is because of repetitive running on hard surface. It is the musculotendinous inflammation, excluding a stress fracture. It is considered as elevated pressure within muscle compartments⁽¹⁾.

The MTSS incidence rate is 13.6% -20% among runners. Usually shin splint is more common in the proximal, medial or distal third of the tibia or in the posterior, anterior, or lateral aspect of the leg^(5,7).

The bone stress reactions, an inflammation of periosteal region and muscular imbalance or Dysfunction are the 3 undetermined theories of MTSS pathology. Development of MTSS is because of various external and internal factors^(3,4).

MTSS pain is commonly located along the posteromedial border of the tibia. However, the severity of MTSS parallel to the frequency and intensity of pain^(8,10).

The muscles that have been implicated are the Tibialis posterior, the soleus and the flexor digitorum longus. Some studies have also suggested that the deep crucial fascia which attaches long border of the tibia may produce a traction stress at the sight of the symptoms of the medial Tibial stress syndrome when the posterior compartments become tight with exercise^(5,16,20).

Foam rolling (FR) is a form of self-massage in which the targeted musculature is rolled and compressed utilizing a FR device. With foam rollers, athletes use their bodyweight to apply pressure to the soft tissues during the rolling motion,

while roller massagers are applied to the target muscles. The motions place both direct and sweeping pressure on the soft tissue, stretching it and generating friction between it and the FR device^(20, 26). The valid test to assess MTSS is shin palpation test.

Hence, the aim of the study is to find out the effectiveness of Foam Roller Based Myofascial release in Medial Tibial Stress Syndrome among the Athletic runners.

2. Materials and Methodology

A total 20 subjects were participants in this study and categorized according to age group that from 24-40 years (both male and female) to predict medial Tibial stress syndrome. Both the age group athletic runners were selected by with randomized sample and were received from Indira Gandhi sports complex around puducherry region. This study design was a pilot study.

The included subjects were track athletes, age group 25-40, both male and female and who are willing to participate. Subjects were excluded stress fracture, deep vein thrombosis, compartment syndrome, distal nerve pain, trauma and paresthesia, surgery and knee pathology. The materials are Foam roller, Blanket, Couch, Wall or door, Pen, Assessment form, Consent form.

3. Outcome Measures

Shin Palpation Test

It is palpation of the distal two thirds of the posteromedial border of the tibia with enough pressure to squeeze out a wet sponge. The level of pain is noted in Numerical Pain Rating Scale.



Shin Palpation Test

Medial Tibial Stress Syndrome Score

MTSS score is commonly used to assess the severity of MTSS. It consists of four main items asking for rating of symptoms on MTSS.

It includes shin with most pain complains of pain presently, while performing sports activity, while walking and at rest. The final score ranges from 0 (no limitation) to 10 (full limitation).

Numerical Pain Rating Scale:

Table 1: Shows rating of pain level

Rating	Pain Level
0	No pain
1-3	Mild pain (nagging, annoying, interfering little with ADLs)
4-6	Moderate pain (interferes significantly with ADLs)
7-10	Severe pain (disabling, unable to perform ADLs)

Pain Assessment is crucially important for both clinical trials and for effective pain management. Numerous instruments have been developed for different types and subtypes of chronic pain qualitative aspects of impact on function. Pain intensity rated on a 0-10.

Procedure

The subject those who fulfill the inclusion criteria were included in the study. The benefit of the study and treatment intervention is explained to the subjects and a written informed consent was taken. The subjects were assessed by using the shin palpation test. The outcome measure is assessed by NPRS and MTSS Score. The total 20 subjects were participated in this study. The foam rolling technique along other conventional exercises was given.

Foam Rolling

Position of the subject

Patient was positioning with the hands support and keeping the body off the ground, non-treated leg being crossed above the affected leg.

Procedure:

The participant should roll the foam roller in distally and proximal direction from just distal to the knee to just proximal to the ankle by supporting some of their body weight with their hands. All the athletes should complete 2 sets of 30 repetitions per day, 3 sessions per week totally five weeks.



Foam Rolling exercise to Medial Tibial Stress Syndrome

Seated Shin Stretch

The seated shin stretch targets the posterior muscles of the lower leg to help reducing the pain in shin area.

Position of the Subject

Kneeling position and sit down gently so that heels are directly beneath the glutes and knees are in front of the subject.

Procedure:

Place both hands of subject on the floor behind and lean back slightly. Gently push down on the heels using body weight to feel the stretch. Then, Lift the knees slightly off the ground to increase the pressure. Hold for 10 seconds and relax for 5 seconds.

All the athletes should complete 2 sets of 10 repetitions per day, 3 sessions per week totally 5 weeks.



Seated shin stretch

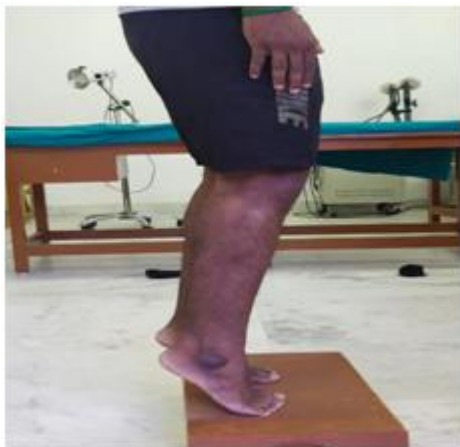
Soleus Muscle Stretch

Position of the Subject

Standing with facing a wall or closed door.

Procedure

Both the hands of subject should be placed on the wall. Step one foot slightly behind the other. Slowly squat down by bending both knees to feel the stretch. Keep both heels on the floor. Hold for 10 seconds and gently relax for 5 seconds and 10 repetitions per day, 3 sessions per week totally 5 weeks.



Soleus muscle stretch



Calf rises

Gastrocnemius Stretch:

Position of the Subject:

Stand on facing a sturdy wall or closed door and so the subject can able to push against it.

Procedure:

Place both hands on the wall. Step the affected foot back (stretching) and keep the other leg straight. Bend the front knee and Keep both feet flat on the floor. Then torso forward to stretch Gastrocnemius muscle. Then move straight leg slightly back for more stretch.

Hold for 10 seconds and gently relax for 5 seconds and 10 repetitions per day, 3 sessions per week totally 5 weeks.



Gastrocnemius stretch

Calf Rises

Stand on a step or step stool with the balls of feet on the stool and the back half floating off of it. Slowly rise up on toes and then drop down, stretch the foot and calf muscle as heels lower. Hold for 10–20 seconds and gently relax for 10 seconds and 10 repetitions per day, 3 sessions per week totally 5 weeks.

4. Statistical Analysis

Data Analysis

The collected data were tabulated and analyzed using descriptive and inferential statistics. The collected data were normally distributed, the mean and standard deviation were used to assess all the parameters of data using social science statistics calculator.

Paired t - test was adopted to find out the effectiveness of posterior foam Roller treatment technique. To find the difference between mean and standard deviation value of pre-test and post-test of NPRS and MEDIAL TIBIAL STRESS SYNDROME SCORE(MTSSS) of a subject treated with foam rolling technique were calculated. Statistical significant was set at $p < 0.0001$ was considered as a significance difference.

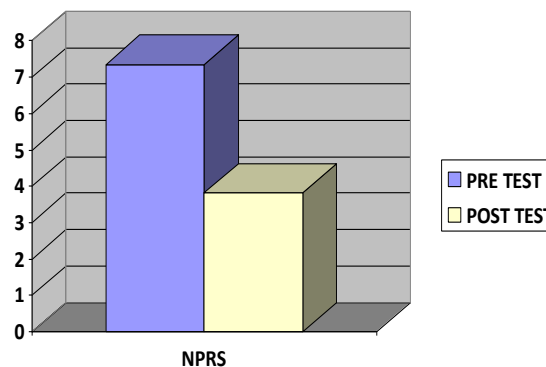
Table 2

The pre and post difference of NPRS (Numerical Pain Rating Scale) test of subjects with mean and standard deviation was analyzed statistically tested by paired t-test. The result is presented in table-2.

NPRS	MEAN	SD	t-Value	p-Value
Pre test	7.35	1.23	23.1318	<0.0001
Post test	3.81	1.06		

The p value of NPRS is < 0.0001 , considered as extremely significant.

The t value of NPRS is 23.1318.



Graphical representation of within the group analysis of NPRS

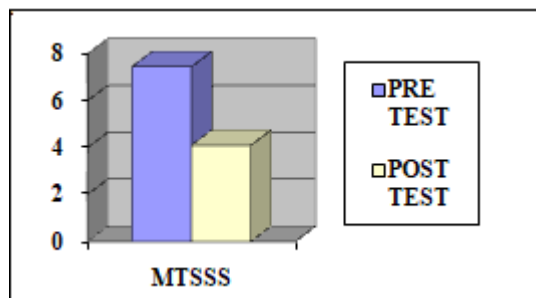
Table –3

The pre and post difference of MTSSS (Medial Tibial Stress Syndrome Score) test of subjects with mean and standard deviation was analyzed statistically tested by paired t-test. The result is presented in table-3.

MTSSS	MEAN	SD	t-VALUE	p-VALUE
Pre test	7.45	1.05	17.1201	<0.0001
Post test	4.10	1.23		

The p value of MTSSS is <0.0001, considered as extremely significant.

The t value of MTSSS is 17.1201.



Graphical representation of within the group analysis of MTSSS

5. Discussion

The present study is the pilot study conducted to find out the Effectiveness of Foam roller Based Myofascial release in Medial Tibial Stress Syndrome among athletic runners. This study was selected to treat the athletic runners who are more prone for shin splints by using foam roller and purpose to get the desirable improvement.

In this study 20 subjects were included under selection criteria, they are randomly allocated and treated with foam roller along with other exercises like seated shin stretch, Soleus stretch, Gastrocnemius stretch, calf raises etc.,

NPRS (Numerical Pain Rating Scale) and MTSSS (Medial Tibial Stress Syndrome Score) are used to assess the pre and post intervention. NPRS is valid tool to assess the nature of the pain. MTSSS is the valid questionnaire used to assess the information about the disability of shin splints among athletic runners.

By Autogenic inhibition the foam roller increases the flexibility in the way it applies pressure to the musculature which triggers mechanoreceptors (GTO), placed the muscle on to relax from injury which is on substantial tension

Edin and Vallbo (1990) found that GTOs were insensitive to the tension produced on the tendon through stretching. If stretch-induced GTO inhibition exists, it is more likely to occur with large-amplitude stretches and not from the small tensile forces that are exerted Foam Rolling. This mechanism contributes to increased flexibility effect on the central pain-modulatory systems and reduces the pain.

Pearcey et al. (2015) investigated the physiological mechanisms of FR, they speculated that rolling might enhance post-exercise recovery of dynamic performance measures via systemic biomechanical effects. These include increased levels of circulating neutrophils and smaller increases in plasma creatine kinase. They activated mechano-sensory sensors which presumably accelerate the healing of the muscle and less active heat-shock proteins and immune cytokines, thus reflecting less cellular stress and inflammation.

Foam roller treatment showed good results in reducing shin splint and reducing shin pain. There is significant improvement in managing the shin pain and disability among athletic runners.

This study showed that the foam roller Based Myofascial release is best treatment for reducing the Medial Tibial Stress Syndrome among the athletic runners.

6. Result

The obtained data was analyzed by using paired 't' test. Comparison of the mean value of pre – test and post – test of NPRS and Medial Tibial Stress Syndrome Score (MTSSS) among athletic runners were evaluated.

The mean value of NPRS score before treatment is 7.35 and after application of treatment is 3.81. The 'P' value is 0.0001. It is concluded that there is highly significant in NPRS.

The mean value of Medial Tibial Stress Syndrome Score (MTSSS) before treatment is 7.45 and after application of treatment is 4.10. The 'P' value is 0.001. It is concluded that there is highly significant in MTSSS.

Comparison of post treatment differences of NPRS and Medial Tibial Stress Syndrome (MTSSS). The 'P' value is 0.0001. After the statistical analysis, it shows that there is reduction in symptoms and severity of the Medial Tibial Stress Syndrome with significant improvement and effective in treatment with Foam Roller based Myofascial release.

7. Conclusion

Therefore, this study concluded that foam roller based Myofascial release is effective in reducing the Medial Tibial Stress Syndrome among athletic runners along with seated shin stretch, Gastrocnemius stretch and heel raises which shows there is significant improvement in reducing the shin pain and disability among Athletic runners.

8. Limitation and Recommendations

In this study, Small size of sample were taken, very short treatment duration, this study was limited to assess only pain of Medial Tibial Stress Syndrome. Only two outcome measures are used in this study, other outcome measures can be recommended. On upcoming research manual therapy techniques can be used and compared, Foam roller can also be used in other musculoskeletal sports injuries.

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