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Effectiveness of Soft Tissue Mobilization and Stretching for Shin Splints Among University Sports Players

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ABSTRACT

Background:

The term "Shin Splints" refers to the pain and discomfort in the leg from repetitive exercise on hard surfaces, or owing to forceful, excessive use of foot flexures. Shin splints are not a particular medical condition. It is only a word used to describe an athlete's persistent shin discomfort after strenuous activity. Shin splints was found more in females than in males. Based on the duration of pain and shoe surface was found to be more prevalent to cause shin splint in marathon runners. Shin splints may develop as a result of overworked, tight muscles, especially the calf muscles (gastrocnemius and soleus). Stretching these muscles aids in releasing tension and reducing pressure on the shinbone, which promotes healing and averts aggravation. Stretching helps muscles and surrounding tissues become more flexible. Better range of motion and less strain on the shinbone can result from increased flexibility, which can help prevent shin splints, which are frequently brought on by activities like running and leaping. By promoting blood flow to the injured region, gentle stretching can help the body recover by supplying vital nutrients and oxygen to the tissues and removing waste materials. Massage aids in the relaxation of tense muscles and the reduction of muscular tension. The calf muscles (gastrocnemius and soleus), as well as other muscles in the lower leg, are frequently overused and tight, which leads to shin splints. A massage therapist may relieve muscular knots, adhesions, and tension by using the proper methods, which can lead to pain alleviation and increased flexibility. Massage improves the flow of blood to the injured region. Improved blood flow helps the body remove waste items and deliver vital nutrients and oxygen to the tissues, which can speed up the healing process and lessen inflammation in the shin region. Pain relief: Massage treatment can encourage the body's natural pain-relieving chemical, endorphins, to be released. This may offer momentary relief from shin splint pain

Aim:

To compare the effectiveness of soft tissue mobilization and stretching on pain
and quality of life in shin splint condition among university students with NPRS and MTSS questionnaire.

Objectives:

- To determine the effectiveness of soft tissue mobilization on pain and quality of life in shin splint condition among university students with NPRS and MTSS questionnaire.
- To determine the effectiveness of stretching on Pain and quality of life in shin splint condition among University students with NPRS and MTSS questionnaire.

Methods:

a. Subjects: Sports player with Shin Splints condition.

b. Sampling technique: Participants will be selected by convenient sampling technique and will be allocated into 2 groups by simple randomization in excel sheet.

c. Sample size: Total sample size is 90. 77 is the calculated sample size and 10% extra sample size added is 84 to avoid disturbances due to dropping out from study and it is rounded off to 90 to easily separate groups.

d. Study design: Experimental study.

Results:

The paired t-test and unpaired t-test were used to statistically analyse the values. A statistically significant difference was found between soft tissue mobilization group and stretching group. According to the statistical analysis performed on the quantitative data, the post-test mean value of the NPRS in soft tissue mobilization group was 3.20, while in stretching group it was 2.09. Additionally, the post-test mean value of the MTSS questionnaire in soft tissue mobilization Group was 4.22, whereas in stretching group it was 1.44. These values yielded a p-value of less than 0.001. This demonstrates that Stretching exercises, have a significant impact on individuals than soft tissue mobilization with Shin splints.

Conclusion:

This study demonstrates an improvement in both soft tissue Mobilization group and stretching group. However, stretching group exercises show some significant improvement than soft Tissue Mobilization in reduction of pain.

Key words:

Soft tissue Mobilization, stretching exercises, shin splints, NPRS, MTSS score

INTRODUCTION

CHAPTER I

1. INTRODUCTION

The term "shin splints" has a disputed definition; it was originally used in 1913 to describe "spike soreness" in runners. The American Medical Association defined Shin Splint syndrome as "Pain and Discomfort in the Leg from Repetitive Activity on Hard Surfaces, or due to Forceful, Excessive Use of Foot Flexures" in 1966. [(1)] There is no specific medical ailment known as "shin splints." It solely refers to the persistent shin discomfort that athletes experience after prolonged effort. The research suggests that there are several reasons why people have shin splint pain, which is a sign of anatomic variation. [(2)]

The front and outer portion of the lower leg can be quite painful during shin splints, also known as medial tibial stress syndrome (MTSS). The discomfort typically intensifies with movement and subsides during periods of rest. [(3)]

Certain medical experts believe that any shin discomfort resulting from exercise should be labeled as "shin splints." However, many people argue that the term should be reserved for specific clinical conditions rather than applied broadly. [(4)]

Plantar fasciitis, tibial stress fractures, metatarsal arch discomfort, peritendinitis in the Achilles tendon, friction syndrome in the iliotibial tract, shin splints (medial tibial stress syndrome), pain related to the knee extension mechanism, Osgood-Schlatter's disease, and ongoing calf muscle pain are listed as the top ten overuse syndromes in athletes. [(5)]

Two comprehensive reviews on the risk variables in runners have found that larger external rotation of the hip, female gender, the use of orthotics, more inexperience with running, a higher body mass index, and navicular drop are connected with a higher risk of shin splint. [(6,7)]

Shin splints, a frequent phrase for sports injuries, describe pain and discomfort in the leg that is caused by overusing the

foot flexors or by forceful or repetitive running on a hard surface. It is important to exclude fractures and ischemia diseases when diagnosing musculotendinous inflammations. [8] Numerous writers have documented a connection between shin splints and the absence of heel contact.

Many runners who have had Shin Splints in the past never make the initial heel contact when jogging, according to Kantor's observations. [9]

Typically, a diagnosis of shin splints involves a physical examination and a review of medical history. In some cases, imaging techniques such as X-rays, magnetic resonance imaging (MRI), or bone scans may reveal a stress fracture or another underlying cause of discomfort. Treatment for medial tibial stress syndrome often includes physical therapy and the use of orthotics. If shin splints persist and worsen without a break from exercise, it is advisable to seek medical advice. Athletes should consider various factors to rule out the likelihood of developing medial tibial stress syndrome. [10]

Static stretching exercises can aid in the recovery of athletes with MTSS and keep it from happening to athletes without the condition. It is best to concentrate on the soleus, gastrocnemius, and hamstring muscles. It has been demonstrated that static stretching results in a plastic reaction that elongates the tissue permanently. [11]

The most prevalent signs and symptoms of overuse include plantar fasciitis, Osgood- Schlatter's disease, medial tibial stress syndrome, knee extension mechanism pains, retrocalcaneal bursitis, iliotibial tract friction syndrome, Achilles tendon peritendinitis, metatarsal arch discomfort, tibia stress fractures, and chronic calf muscle pains. [12]

The research conducted in 2002 by Couture and Karlson revealed a lack of consensus among specialists regarding the cause of MTSS. Addressing the issue can be challenging when the root cause is uncertain. Factors contributing to metatarsalgia risk encompass heightened plantar flexion, stronger plantar flexor muscles, abrupt spikes in training intensity, insufficient calcium intake, running on hard or sloping terrain, inappropriate footwear, and a history of previous injuries. Without a comprehensive comprehension of the origins of shin splints, managing all these risk factors for each athlete becomes nearly impossible. [13]

Inflammation in the surrounding tissue is the source of "shin splints," or pain along the tibia (shinbone). The term medial tibial stress syndrome (MTSS) is another term for it. A prevalent ailment among runners, dancers, and aspiring military personnel is shin splint. Athletes with hyperpronated feet, athletes who have just changed or increased their training regimens, athletes who haven't warmed up sufficiently,

and athletes who have suddenly increased their training miles may all experience this. The tendons, muscles, and bone tissues get overworked with increased activity. Pain is the primary symptom of shin splints. It may occur anywhere, depending on which muscle group is more actively involved. The medial border of the distal portion of the tibia is often painful when medial tibial stress syndrome arises. The anterior tibial compartment muscles hurt when one has anterior Shin Splints. varied amounts of effort can result in varied degrees of pain, but repetitive rhythmic exercise, such as aerobic dance or jogging, is extremely uncomfortable. Similar to several overuse illnesses, shin splints initially cause minor pain that gets worse during exercise and goes away when you rest. [14]

Shin splint symptoms include soreness and chronic pain along the medial tibial border that worsens with movement. Unlike compartment syndromes, where the pain normally goes away as soon as the activity stops, the pain frequently lasts after the action. A MAA statement states that shin splints are "limited to musculotendinous inflammations, excluding ischemic disorders or fractures." [15]

Climate, running on hard surfaces, conditioning techniques, poor running biomechanics, prior foot and arch issues, and running on uneven terrain are all associated with the development of Shin Splint problems. [16] Stress fractures are among the most frequent medical problems that have been mistaken as Shin Splints. These fractures of the tibia and fibula happen spontaneously following extended overexertion. Although it might appear suddenly after a minor injury or after jogging for extended periods of time on pavement or hard terrain without the proper gear or training, pain usually develops over a few weeks or months. In sports, the track athlete is the most susceptible. [17]

MTSS varies from 13.6% to 20% among runners and can occur up to 35% among military recruits. It is presently present in 20% of dancers, and it can be acquired by up to 35% of newly recruited dancers and runners. [18] Shin splints affected men (44.7% of the population) less frequently than they did women (55.3%). Based on the severity of the pain and the shoe surface, more marathon runners than non-marathoners are affected by shin splints. [19]

Many authors have noted that patients experiencing anterior tibial discomfort had raised anterior compartment pressure; nevertheless, the results of pressure measures in the deep posterior compartment have not been especially convincing. (20)

Review articles and textbooks offer various recommendations for avoiding shin splints. These recommendations, which mostly draw from clinical expertise and professional judgment, include the following: Exercises for improving strength and flexibility, stretching exercises, warm-up exercises, proper running form, training approaches that support balanced muscle development and avoid overstressing athletes in need of less training, avoiding running on hard surfaces and hills, rehabilitation for individuals with past injuries, and It's crucial to screen for anatomical concerns like hyperpronation and make the necessary adjustments to mitigate them. (1) The hypothesized processes of MTSS are offered to get people thinking about how Massage Therapy may be used in the treatment of MTSS based on these mechanisms. It is looked into whether these routes could have an impact on treatment. (21)

1.1 BACKGROUND AND NEED FOR STUDY:

The term "shin splints" describes the pain and discomfort in the leg that results from forceful, excessive foot flexures or from repetitive exercise on hard surfaces. Shin splints are not a particular medical condition. It is only a word used to describe an athlete's persistent shin discomfort after strenuous activity.

Females were more likely than guys to get shin splints. Shin splint was determined to be more common in marathon runners based on the length of the pain and the type of shoe.

Excessively utilized, tense muscles, particularly the calf muscles (soleus and gastrocnemius), can result in shin splints. Stretching these muscles aids in releasing tension and reducing pressure on the shinbone, which promotes healing and averts aggravation.

Stretching helps muscles and surrounding tissues become more flexible. Better range of motion and less strain on the shinbone can result from increased flexibility, which can help prevent shin splints, which are frequently brought on by activities like running and leaping.

By promoting blood flow to the injured region, gentle stretching can help the body recover by supplying vital nutrients and oxygen to the tissues and removing waste materials.

Massage aids in the relaxation of tense muscles and the reduction of muscular tension. The calf muscles (gastrocnemius and soleus), as well as other muscles in the lower leg, are frequently overused and tight, which leads to shin splints. A massage therapist may relieve muscular knots, adhesions, and tension by using the proper methods, which can lead to pain alleviation and increased flexibility.

Massage improves the flow of blood to the injured region. Improved blood flow helps the body remove waste items and deliver vital nutrients and oxygen to the tissues, which can speed up the healing process and lessen inflammation in the shin region.

Pain relief: Massage treatment can encourage the body's natural pain-relieving chemical, endorphins, to be released. This may offer momentary relief from shin splint pain

1.2 STATEMENT OF THE PROBLEM:

The issue this study attempts to address is to check the effectiveness of the soft tissue mobilization and stretching for shin splints condition among university sports players. The burden of shin splints on recreational sports players is enormous so, therefore there is a need to assess and manage this efficiently.

1.3 AIM:

To compare the effectiveness of soft tissue mobilization and stretching on pain and quality of life in shin splints

condition among university students with NPRS and MTSS questionnaire.

1.4 OBJECTIVES:

- To determine the effectiveness of soft tissue mobilization on pain and quality of life in shin splints condition among university students with NPRS and MTSS questionnaire.
- To determine the effectiveness of stretching on Pain and quality of life in

shin splints condition among University students with NPRS and MTSS questionnaire.

1.5 HYPOTHESIS

1.5.1 *Null Hypothesis:*

1.5.1 Null Hypothesis:

H01-There will be no significant effect of Soft tissue mobilization for shin splints among university students using NPRS and MTSS questionnaire.

H02-There will be no significant effect of Stretching exercise for shin splints among university students using NPRS and MTSS questionnaire.

1.5.2 *Alternate Hypothesis:*

1.5.2 Alternate Hypothesis:

H01-There will be significant effect of Soft tissue mobilization for shin splints among university students using NPRS and MTSS questionnaire.

H02-There will be significant effect of Stretching exercise for shin splints among university students using NPRS and MTSS questionnaire.

REVIEW OF LITERATURE
CHAPTER II

2. REVIEW OF LITERATURE

1. **SB Thacker** et al (2002) concluded that little objective evidence was found in our review to support the widespread use of any of the current therapies for preventing shin splints. The best and most promising research suggests that wearing shock-absorbing insoles can help avoid shin splints. [(1)]

2. **Timothy A. Tolbert** et al (2009) concluded that athletes are prone to MTSS injuries in significant numbers. Resting and waiting for the MTSS to pass is frequently the only recommendation made. Strength and conditioning professionals can prevent MTSS in athletes and aid in the rehabilitation of those who already have it by implementing a stretching program that includes the stretches described in this article. [(10)]

3. **SarahFogarty** et al (2015) concluded that the explanation of the potential MTSS mechanisms and the comments that follows aim to get readers thinking about potential applications of massage therapy in the management of MTSS. A hypothesis on the potential impact of these processes on treatment is investigated. [(21)]

4. **Marinus Winters** et al (2016) concluded that a credible, dependable, and responsive PROM for gauging the severity of MTSS is the MTSS score. Its purpose is to assess the effectiveness of treatments in clinical trials. [(12)]

5. **Douglas W. Jackson** et al (2017) concluded that the best treatment for incapacitating shin pain is prevention. While "shin splints" is a common word among athletes, it does not refer to a universally recognized condition. Professionals treating leg pain should generally avoid using the term until it is defined properly. Usually, a precise diagnosis can and ought to be made. (22)

6. **WAYNE SMITH** et al (1996) concluded that treatment of shinsplints is a topic of discussion and attention in physical therapy these days. A number of researchers have defended the advantages of various treatment plans for the therapeutic management of shinsplints. There is, however, a dearth of evidence comparing the various approaches' respective efficacies. In this study, young individuals with shinsplints syndrome are treated with ice massage, ultrasound, iontophoresis, and phonophoresis.

The findings show that while each of these therapy approaches was obviously better than a supervised treatment program, none of them was better than the others. According to regression studies, the best ways to treat shinsplints should depend on how well the patient's range of motion is restored, how many treatments are possible, and which treatment option is available. (23)

7. **Pavithra M** et al (2022) concluded that The results show that stretching exercises are more beneficial than strengthening ones. Our results suggest that the stretching exercises suggested here may be helpful for people who use NPRS. It was therefore recommended that this treatment be applied in clinical settings. (24)

8. **Babak Shojaie** et al (2021) concluded that Medial Tibial Stress Syndrome or Shin Splint should be considered a differential diagnosis. Since the interventions differ from chronic exertional compartment syndrome, a correct diagnosis via additional imaging is necessary to avoid treatment failure. In addition, it appears to be a benign, self- limiting illness that does not worsen with age, in contrast to illnesses like arthritis that do. This is shown in tendinopathies of the upper limb and can be generalized to any tendinopathy or periostalgia in the limbs. This suggests that not every patient with this condition requires treatment. The substantial variation in the treatment options indicates that physicians have undue influence on the treatment choice. In cases where patients seek optional therapies for benign diseases such as shin splints, they may benefit from clear, impartial, and impartial information regarding their condition and available treatment alternatives. A decision aid is a common term used to describe this data. Future studies should focus on how decision aids might reduce treatment discrepancies across surgeons and make sure that the patient's values and preferences are taken into consideration when making decisions. (25)

9. **Sultana S, Mondal R** et al (2016) concluded that athletic events and sports-related injuries are closely related. Shin splints are a highly prevalent lower leg ailment among the many patterns of sports injuries associated with the different kinds and characteristics of sports events. The study's data indicates that shin splints are noticeably more common among athletes, with hockey players having a higher incidence than cricket, football, and tennis players. The study also found that shin splints were a more common source of lower leg injuries in general.

This study found a significant correlation between the type of sport, average daily duration, maximum amount of time without rest, and recently improved sports performance, but not a significant correlation between sociodemographic, anthropometric, or lifestyle-related characteristics and risk factors of shin splints. Thus, athletes should be more aware of the risk factors for shin splints, acquire sufficient knowledge about them, and be aware of the prevention and treatment options. The study's limitations included a small sample size and radiographic evidence ruling out stress fractures. Once more, further research is required to determine the prevalence, incidence, and contributing variables of Shin Splints with more accuracy. (26)

SUBJECTS & METHODS

CHAPTER III

3. METHODOLOGY

3.1 STUDY DESIGN: Experimental study

3.2 SUBJECTS**:** Subjects were selected from recreational sports players at ECR and Saveetha University

according to inclusion and exclusion criteria.

3.3 SAMPLING TECHNIQUE: Participants were selected by a convenient sampling technique and allocated into two groups by simple randomization in an Excel sheet.

3.4 SAMPLE SIZE: The total sample size is 90.77, which is the calculated sample size, and the 10% extra sample size added is 84 to avoid disturbances due to dropping out of the study, and it is rounded off to 90 to easily separate groups.

3.5 SELECTION CRITERIA:

3.5.1 INCLUSION CRITERIA:

- Age: 18 -25 years
- Gender: both male and female.
- Those who pass the one leg hop test and shin palpation test.
- Participants with shin splints for minimum 2 days.
- Posterior & medial shin splints.

3.5.2 EXCLUSION CRITERIA:

- Recent injuries
- Recent fractures
- Medial tibial stress fracture
- Cramp
- Burns

3.6 STUDY PROCEDURE

A total of 90 university students with shin splints were divided into two groups. stretching group (n = 45) and soft tissue mobilization group (n = 45).

Soft tissue mobilization: 45 subjects with Shin splints have been given soft tissue mobilization for 18 minutes, 5 days per week, for 2 weeks, for a total duration of 180 minutes for 2 weeks.

Soft tissue mobilization technique:

- Remedial massage (effleurage, petrissage, and skin rolling) along the Soleus aponeurosis in the direction of normal stress was given for 9 minutes.
- Remedial massage (effleurage, petrissage, and skin rolling) along the Soleus aponeurosis in the direction of abnormal stress was given for 9 minutes.

Stretching Group: 45 subjects with Shin splints have been given active stretching for 18 minutes, 5 days per week, for 2 weeks, for a total duration of 180 minutes for 2 weeks.

3.6.1 Materials Required: A mat or any cloth

TREAMENT PROTOCOL

Soft tissue mobilization Group. Stretching exercises Group.

Exercise Regime for stretching exercises procedure:

Supine Hamstring stretch with floor- The standing hamstring stretch is executed by the person standing on one leg, bending forward at the waist, and placing the leg being stretched forward on an elevated surface. It's crucial to remember that the spine shouldn't be flexed when doing this 10 stretch. There are 2 ways to do the supine hamstring stretch. In the first, the athlete is positioned supine in a doorway, with one leg extended toward the wall and the other lying flat on the ground. Stretching with a partner is how the second way is executed. Stretching an athlete while they are supine. While keeping the other leg flat on the floor, the partner will flex the leg that needs to be stretched. You should continue doing both stretches until your hamstrings feel comfortably stretched. Holding the stretch for 30 seconds is recommended. Three of these stretches should be done, separated by a fifteen-second rest period. The stretching is being done actively.

Heel drop for Gastrocnemius- With their weight on their forefoot and their ankle in plantar flexion, the athlete stands straight on the leg that has to be stretched. Holding the stretch for 30 seconds is recommended. Three of these stretches should be done, separated by a fifteen-second rest period. The stretching is being done actively.

Gastrocnemius wall stretch- The athlete adopts a staggered posture, placing the leg to be stretched in the back while maintaining a firm heel on the ground. The athlete is positioned several feet away from a wall. The athlete maintains full knee extension as they bend forward and press their palms against the wall, dorsiflexing their ankles. The foot needs to remain 90 degrees off the wall and straight. Holding the stretch for 30 seconds is recommended. Three repetitions of the stretch should be made, with a 15- second rest in between. The stretching is being done actively.

Soleus stretch- It is necessary to slightly flex the knee in order to stretch the soleus. During the stretch, the gastrocnemius can be reduced because to this small bending. The soleus is more effectively isolated by the gastrocnemius's shortening. The athlete should stand near to a wall with their back straight, their legs staggered, and their palms facing the wall. The athlete should begin by assuming a position that permits them to bend their legs and sink their buttocks. The athlete should lean against the wall until their lower calf feels comfortably stretched. Holding the stretch for 30 seconds is recommended. Three repetitions of the stretch should be done, separated by a 15-second rest period. The stretching is being done actively.

Regime for Soft tissue mobilization procedure:

Effleurage- Effleurage is a massage technique that involves long, sweeping or gliding strokes applied to the body with varying degrees of pressure. Effleurage typically involves long, rhythmic strokes that glide over the skin's surface. The therapist's hands or fingertips maintain continuous contact with the client's body, creating a smooth and flowing movement. The strokes are generally applied in the direction of blood flow towards the heart. Effleurage can be performed with variable pressure, ranging from light and soothing to firmer and deeper, depending on the massage therapist's intention and the client's preferences.

Skin rolling- Skin rolling is a manual therapy technique commonly used in massage therapy and various bodywork practices. It involves the gentle lifting and rolling of the skin and underlying tissues between the therapist's fingers or hands. This technique is employed to promote mobility, improve circulation, and target specific areas of tension or adhesions in the soft tissues.

Petrissage- Petrissage is a massage technique that involves kneading, compression, and rolling movements applied to the

soft tissues. While petrissage is often used in general massage therapy, its application to the muscles involved in shin splints can be beneficial for promoting relaxation, improving blood circulation, and reducing muscle tension.

3.7 OUTCOME MEASURES:

Numerical pain rating scale (NPRS): The Numeric Pain Rating Scale (NPRS) was used to measure the degree of pain. The NPRS is a 10-point rating system, with 0 denoting "no pain" and 10 denoting "worst pain." To express their amount of pain, respondents were asked to select one number on the scale. The "0" points answer10 was not included in the study.

MTSS questionnaire: The Medial tibial stress syndrome score is a 4 item questionnaire with response options with descriptors for the degree of shin pain and limitations.

Figure-1 soleus stretch

Figure-2 Gastrocnemius wall stretch

Figure-3 hamstring stretch with floor

Figure-4 Heel drop

Figure 5: Soft tissue mobilization

STATISTICAL ANALYSIS &

RESULT

CHAPTER IV

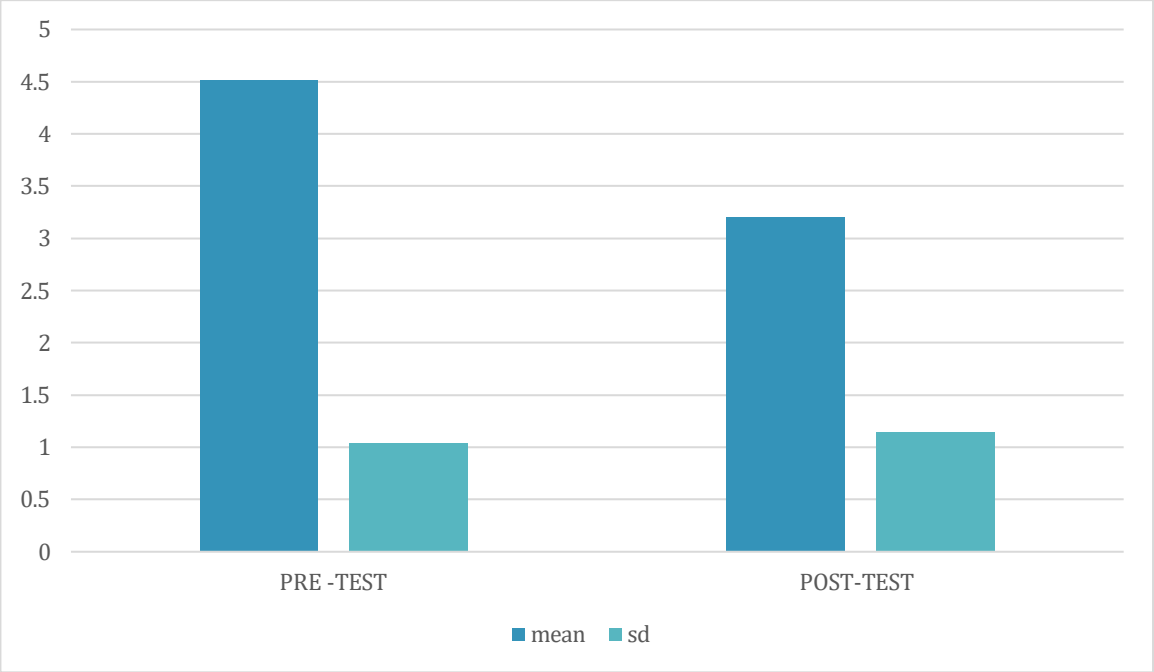
4.1 STATISTICAL PROCEDURE:

The gathered information was analysed and examined. For each parameter, the mean and standard deviation were utilized. The statistically significant differences between pre - test and post-test measures were examined using the paired t- test. The difference between the post-test values was determined.

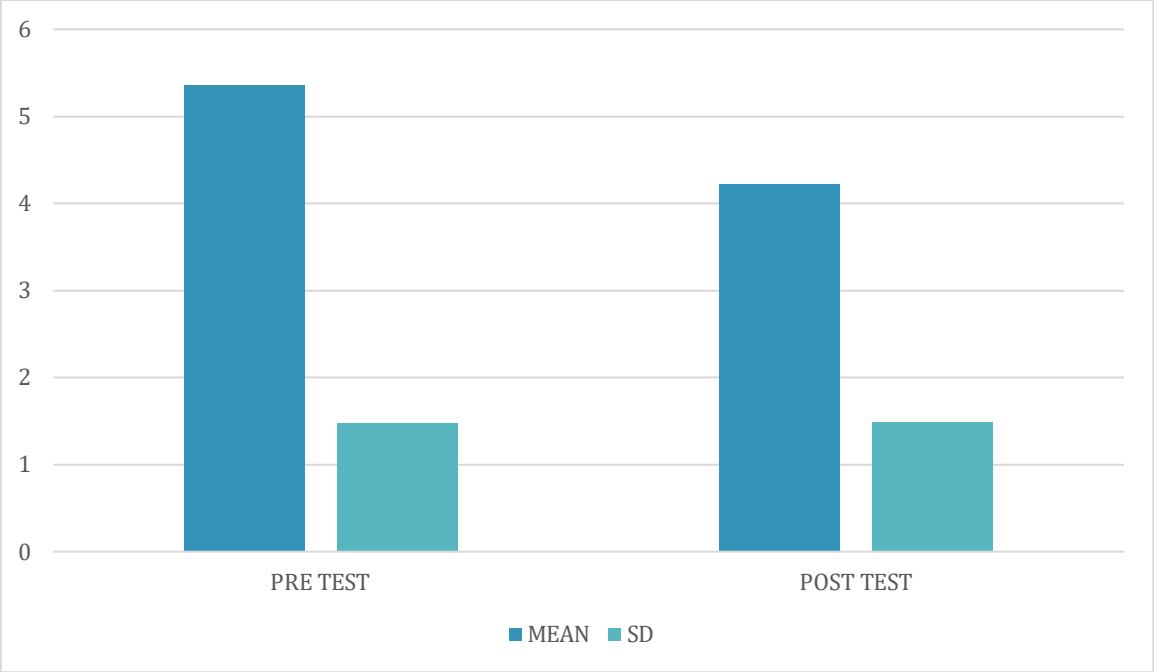
STATISTICAL ANALYSIS:

Table 1: Pre and post-test values of soft tissue mobilization Group

Outcome	Soft tissue mobilization group	Mean	SD	T-value	P-value
NPRS	Pre-test	4.51	1.04	17.0967	< 0.0001
	Post-test	3.20	1.12		
MTSS	Pre-test	5.36	1.48	22.1151	< 0.0001
	Post-test	4.22	1.49		



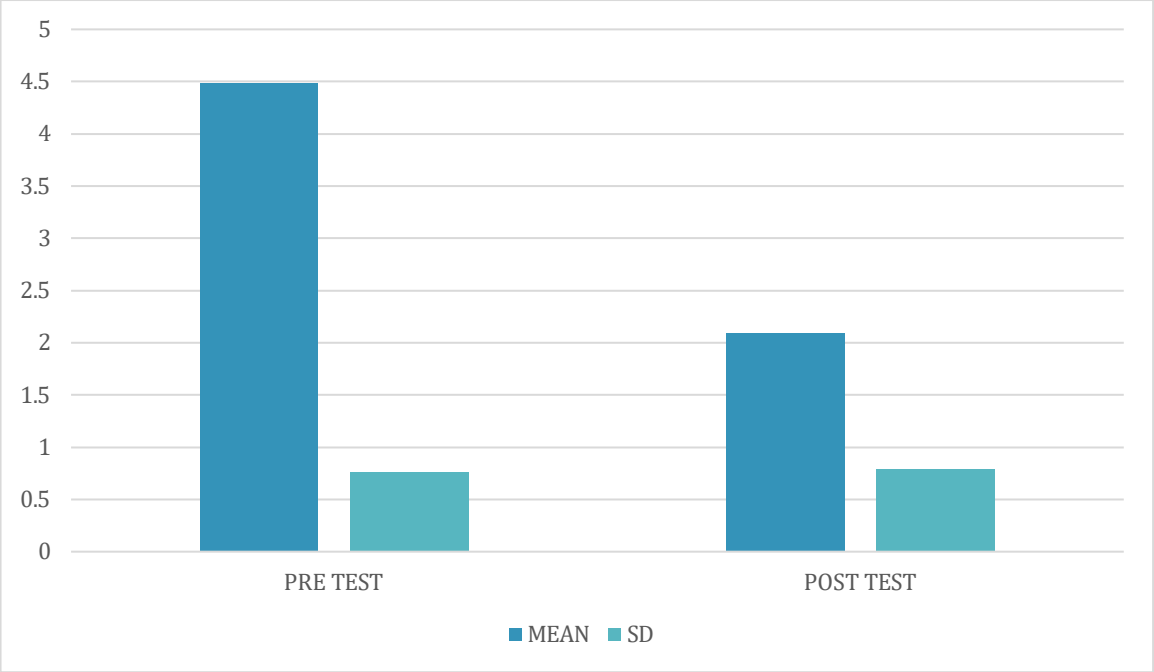
Graph 1: Pre and post-test values of soft tissue mobilization Group of NPRS



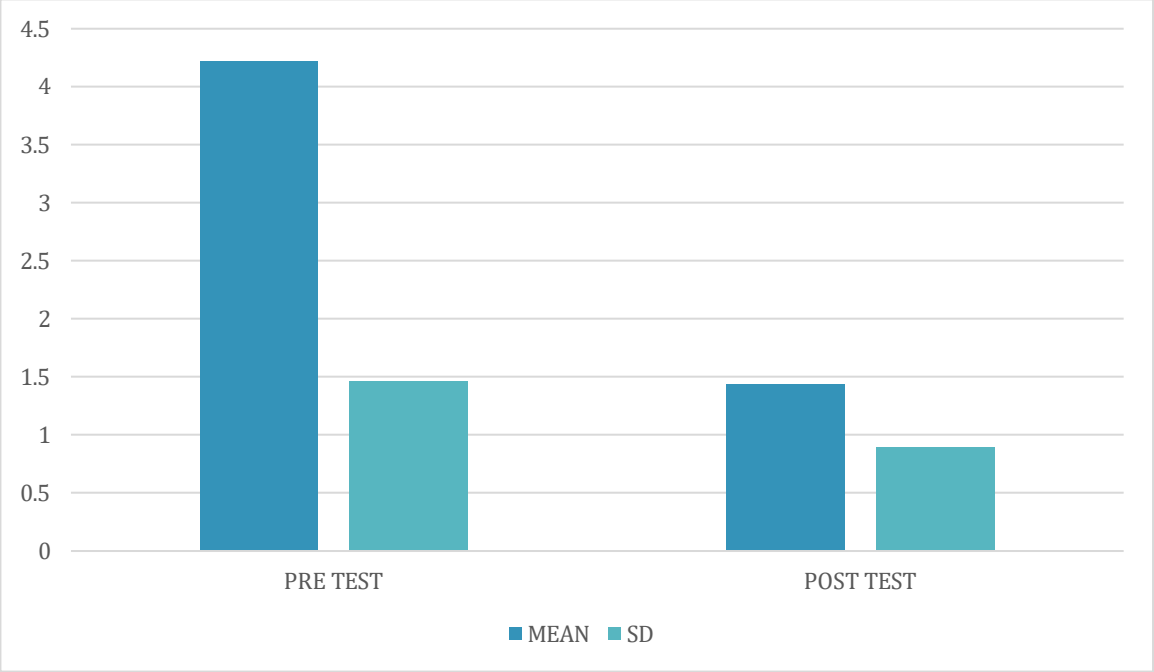
Graph 2: Pre and post-test values of soft tissue mobilization Group of MTSS questionnaire

TABLE 2: Pre and post-test values of stretching Exercise Group

Outcome	Stretching Group	Mean	SD	T-value	P-value
NPRS	Pre-test	4.49	0.76	23.4160	<0.0001
	Post-test	2.09	0.79		
MTSS	Pre-test	4.22	1.46	10.8874	<0.0001
	Post-test	1.44	0.89		



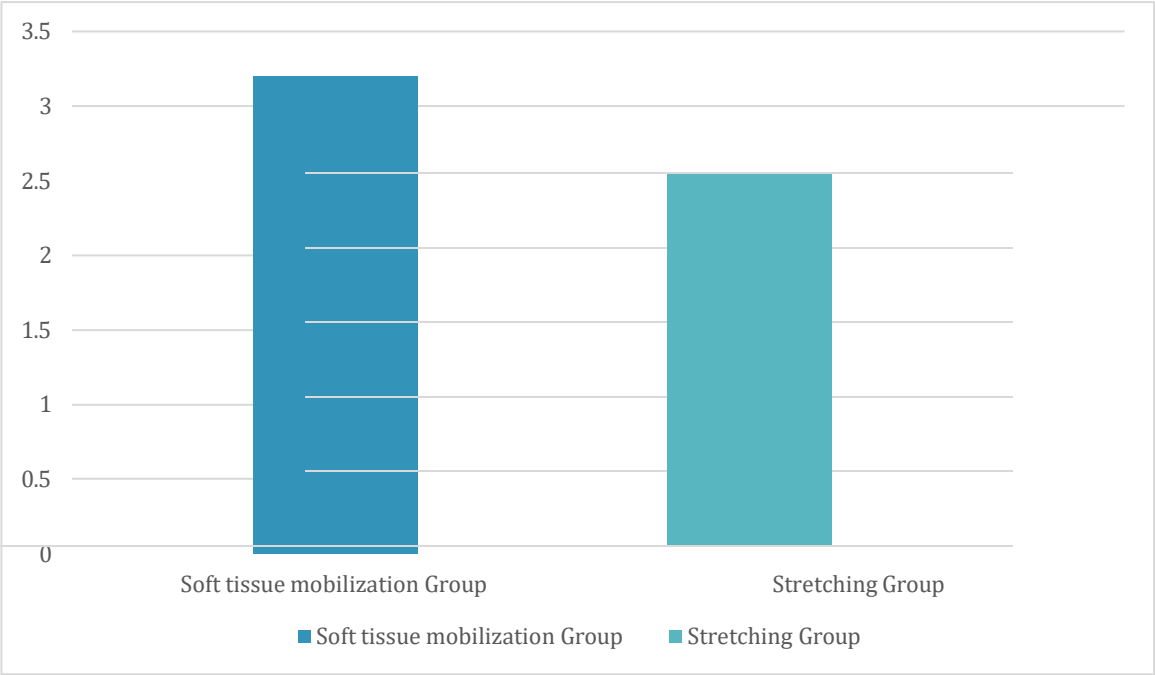
Graph 3: Pre and post-test values of Stretching Exercise Group of NPRS



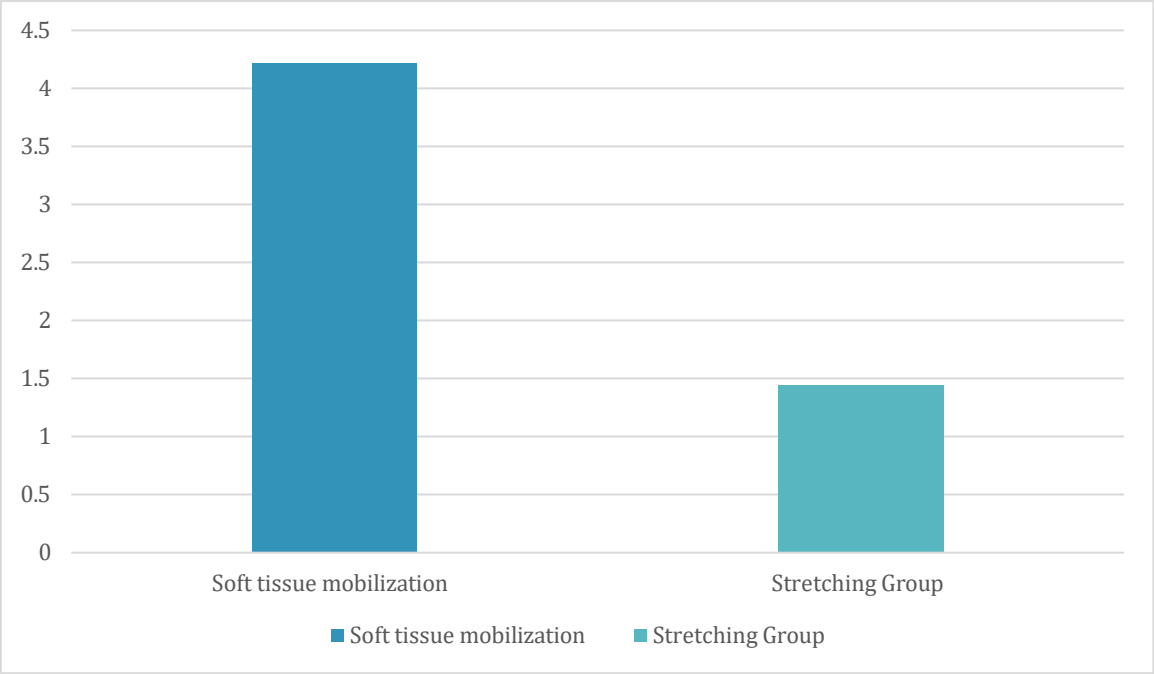
Graph 4: Pre and post-test values of Stretching Exercise Group of MTSS questionnaire

Table 3: Post-test values of soft tissue mobilization and stretching Exercise Group

Outcome	Post-test	Mean	SD	T-value	P-value
NPRS	Soft tissue mobilization Group	3.20	1.12	5.4320	< 0.0001
	Stretching Group	2.09	0.79		
MTSS	Soft tissue mobilization Group	4.22	1.49	10.7222	< 0.0001
	Stretching Group	1.44	0.89		



Graph 5: Comparison of Post MEAN value of soft tissue mobilization group and stretching Group using NPRS



Graph 6: Comparison of Post MEAN value of soft tissue mobilization group and stretching Group using MTSS questionnaire.

4.2 RESULT:

When compared the pre-assessment, the post assessment shows there is a significant decrease in the pain by using the NPRS and MTSS Questionnaire. The statistical mean value of NPRS pre intervention was 4.51 and MTSS Questionnaire was 5.36 and the mean value of NPRS post intervention was 3.20 and MTSS Questionnaire was 4.22 for the people who were given the soft tissue mobilization ,whereas the statistical mean value for the people who were given the stretching exercises the NPRS pre intervention was 4.49 and MTSS Questionnaire was 4.22 and the mean value of NPRS post intervention was 2.09 and MTSS Questionnaire post intervention was 1.44 with p value less than 0.0001

The NPRS in the people with stretching exercise was 2.09 and it showed significance difference than the people who were given the soft tissue mobilization 3.20 with the t value 5.4320. The same way the MTSS Questionnaire in both groups are analysed. The group with stretching exercises shows the significant difference in the pain than the people who were given the soft tissue mobilization.

The post mean value for NPRS is 3.20 and the MTSS questionnaire is 4.22 in the soft tissue mobilization whereas the post mean value for the NPRS is 2.09 and the MTSS questionnaire is 1.44 in the people with stretching with t values 5.4320 in NPRS and 10.722 in MTSS questionnaire and p value is less than 0.0001

This demonstrates that the stretching exercises group shows the final results in more reduction of the pain compared with the soft tissue mobilization group.

DISCUSSION

CHAPTER V

5. DISCUSSSION The purpose of the current study is to compare the effectiveness of soft tissue mobilization and stretching for shin splints among university sports players. Paired and Unpaired t-tests with a baseline of significance of 0.05 were used to statistically evaluate pre-test and post-test data of parameter NPRS and MTSS questionnaire. Both soft tissue mobilization group and stretching group individuals got treatment for a total of 2 weeks. The NPRS and MTSS questionnaire pre-test is measured prior to therapy and post-test is measured after 2 weeks. The soft tissue

mobilization group will receive treatment for 18 minutes and stretching group receives stretching exercises for 18 minutes for a period of 5 days a week for 2 weeks with a total duration of 180 minutes. Based on statistical analysis, the findings of the current study indicate that there is a significant improvement in both but stretching group exercises reduces pain more than soft tissue mobilization.

Sarah Fogarty et al. (2015) detail the different mechanisms involved in MTSS and offer insights into the potential use of massage therapy in its treatment. Their commentary encourages reflection on how massage therapy could be applied based on these identified processes. A hypothesis on the potential impact of these processes on treatment is investigated. (21)

Tolbert TA's conclusion is that medial tibial stress syndrome is often addressed through the utilization of physical therapy and orthotics. You'll need to consult a doctor if your shin splints worsen and you don't take a break from working out. Athletes should rule out medial tibial stress syndrome by taking into account a number of criteria. (10)

The findings indicate that stretching activities are more advantageous than strengthening ones, according to Pavithra M et al. (2022). Our findings imply that those who utilize NPRS may benefit from the stretching activities recommended here. Therefore, it was suggested that this therapy be used in a therapeutic environment. (24)

Static stretching exercises can aid in the recovery of athletes with MTSS and keep it from happening to athletes without the condition. It is best to concentrate on the soleus, gastrocnemius, and hamstring muscles.

It has been demonstrated that static stretching results in a plastic reaction that elongates the tissue permanently. (11)

Tightness in the hamstring and heel muscles has been demonstrated to be a strong indicator of suffering an MTSS injury. (27)

The study's goal was to compare the effects of soft tissue mobilization and stretching exercises on subjects. According to the inclusion criteria, this study was done on 90 volunteers between the ages of 18 and 25, who were randomly separated into two groups (soft tissue mobilization groups and stretching group).

Stretching group were given stretching exercises, while those in soft tissue mobilization group were given soft tissue mobilization.

When compared the pre-assessment, the post assessment shows there is a significant decrease in the pain by using the NPRS and MTSS Questionnaire. The statistical mean value of NPRS pre intervention was 4.51 and MTSS Questionnaire was 5.36 and the mean value of NPRS post intervention was 3.20 and MTSS Questionnaire was 4.22 for the people who were given the soft tissue mobilization ,whereas the statistical mean value for the people who were given the stretching exercises the NPRS pre intervention was 4.49 and MTSS Questionnaire was 4.22 and the mean value of NPRS post intervention was 2.09 and MTSS Questionnaire post intervention was 1.44 with p value less than 0.0001.The NPRS in the people with stretching exercise was 2.09 and it showed significance difference than the people who were given the Soft Tissue Mobilization 3.20 with the t value 5.4320 The same way the MTSS Questionnaire in both groups are analysed. The group with stretching exercises shows the significant difference in the pain than the people who were given the soft tissue mobilization.

The post mean value for NPRS is 3.20 and the MTSS questionnaire is 4.22 in the soft tissue mobilization whereas the post mean value for the NPRS is 2.09 and the MTSS questionnaire is 1.44 in the people with Stretching with t values 5.4320 in NPRS and 10.722 in MTSS questionnaire and p value is less than 0.0001.

This demonstrates that the stretching exercise group shows the final results in a greater reduction of pain compared with the soft tissue mobilization group.

LIMITATIONS & RECOMMENDATIONS

CHAPTER VI

LIMITATIONS & RECOMMENDATIONS:

6.1 LIMITATIONS:

1. People with posterior and medial shin splints were only selected.
2. The study has a limited follow-up period.
3. This study has a specific age group population included.

6.2 RECOMMENDATIONS:

1. Anterior shin splints can also be taken.
2. The study could be done with a larger sample size.

CONCLUSION

CHAPTER VII

7. CONCLUSION

This study reveals noteworthy enhancements in both the soft tissue mobilization and stretching groups. While both modalities exhibited positive outcomes, the stretching group exhibited a more pronounced and statistically significant reduction in pain compared to the soft tissue mobilization group. This underscores the efficacy of stretching exercises in mitigating pain, thereby suggesting its potential as a preferential intervention in clinical or therapeutic settings.

REFERENCES

CHAPTERVIII

8. REFERENCES

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APPENDICES

CHAPTER IX

APPENDIX – A: ISRB CERTIFICATE:

SAVEETHA COLLEGE OF PHYSIOTHERAPY
SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES
(Declared as Deemed to be University under Section 3 of UGC Act 1956)

INSTITUTIONAL SCIENTIFIC REVIEW BOARD

Date of Submission/Presentation	**17-08-2023**
ISRB Number	**03/ 023/ 2023/ ISRB/ SR / SCPT**
Research Type	Faculty / Post Graduate/ **Under Graduate**
Title of the research Project	EFFECTIVENESS OF THE SOFT TISSUE MOBILIZATION AND STRETCHING FOR SHIN SPLINTS AMONG UNIVERSITY SPORTS PLAYERS.
Name of the Principal Investigator With Registration number	**R.Rahul** **182001064**
Name of the Guide/Supervisor	**Dr Jagatheesan.A**

The Research proposal has been reviewed by the ISRB and decision is:

Approved	
Approved with Modifications	✓
Resubmit	
Not Approved	

Suggestions:

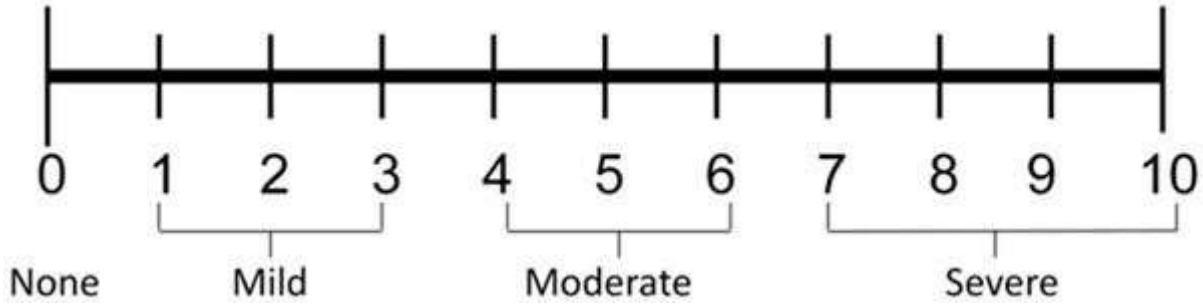
Study population- long distance runners, athletes ; What type of shin splints; Type of stretching;Inclusion - shin splint (duration); Need for the study.

Chair Person
Dr. A. Jagatheesan

Member Secretary
Dr. Prathap S

APPENDIX- B

NPRS SCALE:



Numerical pain rating scale (NPRS): The Numeric Pain Rating Scale (NPRS) was used to measure the degree of pain. The NPRS is a 10-point rating system, with 0 denoting "no pain" and 10 denoting "worst pain." To express their amount of pain, respondents were asked to select one number on the scale. The "0" points answer10 was not included in the study.

APPENDIX C

Medial tibial stress syndrome score

Name: **Date:**

I have complaints in:

☐ Both shins

☐ Only the Right shin

☐ Only the Left shin

In case of complaints in both shins: I have most complaints in

☐ My left shin

☐ My right shin

For all questions, choose one answer per question only.

Sporting activities

For military: Marching is considered to be a sporting activity.

1) Presently:

☐ I perform all of my usual sporting activities

☐ I am forced to do less of my usual sporting activities due to pain in my shin

☐ I am forced to do alternative sporting activities only due to pain in my shin

☐ I cannot do any sporting activity due to pain in my shin

2) While performing sporting activities:

☐ I have no pain in my shin

☐ I have some pain in my shin

☐ I have a lot of pain in my shin

☐ I cannot do any sporting activity due to my shin pain

Walking

3) **While walking:**

☐ I have no pain in my shin

☐ I have some pain in my shin

☐ I have a lot of pain in my shin

☐ I cannot walk due to pain in my shin

Pain at rest

e.g. sitting or lying down

4) At rest, my shin is:

☐ Not painful

☐ Sensitive

☐ Painful

☐ Very painful

APPENDIX-F

Information sheet

1. **Title of the research project**: Effectiveness of soft tissue mobilization and stretching for university students with shin splints condition.
2. **Description of the study**: The study focuses on the Effectiveness of Soft tissue mobilization and Stretching for university students with Shin Splints condition. Subjects were randomly assigned in to one of two groups: Soft tissue mobilization group(n=45) and Stretching exercise group(n=45) Interventions: Soft tissue mobilization group:45 subjects with Shin splints have been given with Soft tissue mobilization for 18 minutes 5 days per week for 2 weeks with a total duration of 180 minutes for 2 weeks. Remedial massage (Effleurage, Petrissage and Skin rolling) along the Soleus Aponeurosis in the direction of normal stress was given for 9 minutes. Remedial massage (Effleurage, Petrissage and Skin rolling) of Soleus in the direction of abnormal stress was given for 9 minutes.
Stretching exercise group: subjects with Shin splints has been given with active Stretching for 18 minutes 5 days per week for 2 weeks and, with a total duration of 180 minutes for 2 weeks.

Supine Hamstring stretch with floor- The standing hamstring stretch is executed by the person standing on one leg, bending forward at the waist, and placing the leg being stretched forward on an elevated surface. It's crucial to remember that the spine shouldn't be flexed when doing this 10 stretch. There are 2 ways to do the supine hamstring stretch. In the first, the athlete is positioned supine in a doorway, with one leg extended toward the wall and the other lying flat on the ground. Stretching with a partner is how the second way is executed. Stretching an athlete while they are supine. While keeping the other leg flat on the floor, the partner will flex the leg that needs to be stretched. You should continue doing both stretches until your hamstrings feel comfortably stretched. Holding the stretch for 30 seconds is recommended. Three of these stretches should be done, separated by a fifteen-second rest period. The stretching is being done actively.

Heel drop for Gastrocnemius- With their weight on their forefoot and their ankle in plantar flexion, the athlete stands straight on the leg that has to be stretched. Holding the stretch for 30 seconds is recommended. Three of these stretches should be done, separated by a fifteen-second rest period. The stretching is being done actively.

Gastrocnemius wall stretch- The athlete adopts a staggered posture, placing the leg to be stretched in the back while maintaining a firm heel on the ground. The athlete is positioned several feet away from a wall. The athlete maintains full knee extension as they bend forward and press their palms against the wall, dorsiflexing their ankles. The foot needs to remain 90 degrees off the wall and straight. Holding the stretch for 30 seconds is recommended. Three repetitions of the stretch should be made, with a 15- second rest in between. The stretching is being done actively.

Soleus stretch- It is necessary to slightly flex the knee in order to stretch the soleus. During the stretch, the gastrocnemius can be reduced because to this small bending. The soleus is more effectively isolated by the gastrocnemius's shortening. The athlete should stand near to a wall with their back straight, their legs staggered, and their palms facing the wall. The athlete should begin by assuming a position that permits them to bend their legs and sink their buttocks. The athlete should lean against the wall until their lower calf feels comfortably stretched. Holding the stretch for 30 seconds is recommended. Three repetitions of the stretch should be done, separated by a 15-second rest period. The stretching is being done actively.

Effleurage- Effleurage is a massage technique that involves long, sweeping or gliding strokes applied to the body with varying degrees of pressure. Effleurage typically involves long, rhythmic strokes that glide over the skin's surface. The therapist's hands or fingertips maintain continuous contact with the client's body, creating a smooth and flowing movement. The strokes are generally applied in the direction of blood flow towards the heart. Effleurage can be performed with variable pressure, ranging from light and soothing to firmer and deeper, depending on the massage therapist's intention and the client's preferences.

Skin rolling- Skin rolling is a manual therapy technique commonly used in massage therapy and various bodywork practices. It involves the gentle lifting and rolling of the skin and underlying tissues between the therapist's fingers or hands. This technique is employed to promote mobility, improve circulation, and target specific areas of tension or adhesions in the soft tissues.

Petrissage- Petrissage is a massage technique that involves kneading, compression, and rolling movements applied to the soft tissues. While petrissage is often used in general massage therapy, its application to the muscles involved in shin splints can be beneficial for promoting relaxation, improving blood circulation, and reducing muscle tension.

3. **Possible risk of the participant**: No risk is involved in this study such as burns and compensation will be provided and treated for free if affected with it.
4. **Benefit of the study**: Individuals will be benefited from this study.

5. **Compensation to the participant**: Compensation will be provided during or at the end of the study if affected by any possibility risks.
6. **Confidentiality**: Information received from the patients will be kept safe and only used for research purposes.
7. **Participant right to withdraw from the study**: Individuals can withdraw at any time of the study.
8. **Complaints regarding the study should be reported to**: Any complaints regarding the study can be informed to the Clinical in charge of Saveetha physiotherapy department, SMCH.
9. **Detailed information and clarification can be obtained from**: Name: Rahul.R, Address: UG, VII semester, SCPT, SIMATS.
10. Rahul.R has explained clearly to the participant all the above details. All questions and clarifications by the participant have been fully answered.
11. Signature of the Participant with date:

APPENDIX-G

தகவல் தாள்:

1. ஆராய்ச்சித்திட்டத்தின் தலைப்பு: நீட்சி மற்றும் சமன்றமயாைை திசு அணிதிரட்டலின் சசயல்திைன் சின்ஸ்ப்ளின்ட்ஸ் நிறைறயக் சகாண்டு உள்ள கல்லூரி மாணவர்களுக்கு.

2. ஆய்வின் விளக்கம்: நீட்சி மற்றும் சமன்றமயாைை திசு அணிதிரட்டலின் சசயல்திைன் சின்ஸ்ப்ளின்ட்ஸ் நிறைறயக் சகாண்டு உள்ள கல்லூரி மாணவர்களுக்கு. ஆய்வு கவைம் சசலுத்துகிைதுபாடங்கள் கதாராயமாக இரண்டு குழுக்களில் ஒன்றுக்கு ஒதுக்கப்படும்: சமன்றமயாைை திசு அணிதிரட்டல் குழு (n=45) மற்றும் நீட்சி உடற்பயிற்சி குழு(n=45). **தலையீடுகள்:** சமன்றமயாைை திசு அணிதிரட்டல் குழு: ஷின் சின்ஸ்ப்ளின்ட்ஸ் சகாண்ட
45 பாடங்களுக்கு சமன்றமயாைை திசு அணிதிரட்டல் வாரத்திற்கு 18 நிமிடங்கள் 5 நாட்கள் 2 வாரங்கள், ஒரு 2 வாரங்களுக்கு 180 நிமிடங்கள் சமாத்த காைம். சாதாரண அழுத்தத்தின் திறசயில் கசாலியஸின் நிவாரண மசாஜ் (எஃபிளூகரஜ் சபட்ரிஸ்கசஜ் மற்றும் ஸ்கின் கராலிங்) 9 நிமிடங்களுக்கு வழங்கப்படுகிைது.அசாதாரண அழுத்தத்தின் திறசயில் கசாலியஸின் நிவாரண மசாஜ் (எஃபிளூகரஜ் சபட்ரிஸ்கசஜ் மற்றும் ஸ்கின் கராலிங்) 18 நிமிடங்களுக்கு வழங்கப்படுகிைது.

ஸ்ட்ரரச்சிங் உடற்பயிற்சி குழு :ஷின் ஸ்பிளிண்ட்ஸ் உள்ள பாடங்களுக்கு ஸ்ட்சரச்சிங் வாரத்திற்கு 18 நிமிடங்கள் 5 நாட்கள் 2 வாரங்கள், சமாத்தம் 180 நிமிடங்கள் .
சுறபன் ஹாம்ஸ்ட்ரிங் தறரயுடன் நீட்டுதல் - தனி நபர் ஒரு காலில் நிற்கும் கபாது, நீட்டப்பட்ட காறை ஒரு உயர்த்தப்பட்ட கமற்பரப்பில் முன்கைாக்கி றவத்து, அகத கநரத்தில் இடுப்பில் முன்கைாக்கி வறளந்திருக்கும் கபாது நின்று சதாறட நீட்சி
சசய்யப்படுகிைது. இந்த நீட்டிப்றபச் சசய்யும்கபாது, முதுகுத்தண்டு வறளக்கப்படக்கூடாது என்பறத கவைத்தில் சகாள்ள கவண்டும் ஸ்றபன் சதாறட நீட்சிறய 2 வழிகளில் ! சசய்யைாம். முதைாவது தடகள வீரர்

ஒரு வீட்டு வாசலில்
படுத்துக் சகாண்டு, நீட்டப்பட்ட காறை சுவரில் றவக்கிைார். மற்சைாரு கால் தறரயில் தட்றடயாக உள்ளது. இரண்டாவது முறை ஒரு பங்குதாரர் நீட்டிக்கப்படுகிைது. நீட்டப்பட்ட தடகள வீரர் படுத்துக் கிடக்கிைார்.
பங்குதாரர் எதிர் காறை தறரயில் தட்றடயாக றவத்து நீட்ட கவண்டிய காறை வறளப்பார், சதாறட எலும்புகளில் ஒரு வசதியாை நீட்சி உணர்வு உணரப்படும் வறர இரண்டு நீட்டிப்புகளும் சசய்யப்பட கவண்டும் நீட்சிறய 30 விநாடிகள் றவத்திருக்க கவண்டும். நீட்டிப்புகளுக்கு இறடயில் 15 விநாடி இறடசவளியுடன் 3 முறை நீட்டிக்கப்பட கவண்டும்.

காஸ்ட்கராக்னீமியஸுக்கு குதிகால் வீழ்ச்சி- தடகள வீரர் கால்கறள நீட்ட கவண்டும். உடல் எறடறய முன் பாதத்திலும் கணுக்காலிலும் உள்ளாறடவறளந்த நிறையில் நிற்கிைார் நீட்சிறய 30 விநாடிகள் றவத்திருக்க கவண்டும் நீட்டிப்புகளுக்கு இறடயில் 15 விைாடி இறடசவளியுடன் 3 முறை நீட்டிக்கப்பட கவண்டும்.

காஸ்ட்கராக்னீமியஸ் சுவர் நீட்சி -தடகள வீரர் ஒரு சுவரில் இருந்து பை அடி தூரத்தில் நிற்கிைார். தடகள வீரர் தள்ளாடும் நிறைப்பாட்றடக் சகாண்டுள்ளார், கால் பின்புைாக நீட்டப்படகவண்டும், குதிகால் தறரயில் உறுதியாக இருக்க கவண்டும் தடகள வீரர் முன்கைாக்கி சாய்ந்து றகளின் உள்ளங்றகறள சுவருக்கு எதிராக றவத்து, கணுக்கால் முதுகுப்பகுதிக்கு சசல்லும். அகத கநரத்தில் முழு முழங்கால் நீட்டிப்றப பராமரிக்கிைார். கால் கநராகவும், சுவரில் இருந்து 90° ககாணமாகவும் இருக்க கவண்டும். நீட்சிறய 30 விநாடிகள் றவத்திருக்க கவண்டும். நீட்டிப்புகளுக்கு இறடயில் 15 விநாடி இறடசவளியுடன் 3 முறை நீட்டிக்கப்பட கவண்டும்.

கசாலியஸ் நீட்டிப்பு - கசாலியஸ் ஐ சரியாக நீட்ட முழங்கால் சற்று வறளந்திருக்க கவண்டும். இந்த சிறிய சநகிழ்வு நீட்டிக்கப்படும் கபாது காஸ்ட்கராக்னீமியறஸ சுருக்க அனுமதிக்கிைது. காஸ்ட்கராக்னீமியஸின் இந்த சுருக்கமாைது கசாலியறஸ சிைப்பாக தனிறமப்படுத்துகிைது. தடகள் வீரர் கால்கள் நிறைதடுமாறி, முதுறக கநராகவும். உள்ளங்றகறய சுவருக்கு எதிராகவும் சுவருக்கு அருகில் றவக்க கவண்டும்.
சதாடங்குவதற்கு. தடகள் கால்கள் வறளந்து, பிட்டம் றகவிடப்படுவறத அனுமதிக்கும் நிறையில் இருக்க கவண்டும் அவர் அல்ைது அவள் கீழ் கன்றுக்கு ஒரு வசதியாை நீட்சிறய உணரும் வறர தடகை சுவரில் சாய்ந்து சகாள்ளுங்கள் நீட்சிறய 30 விநாடிகள்
றவத்திருக்க கவண்டும்.
நீட்டிப்புகளுக்கு இறடயில் 15 விநாடி இறடசவளியுடன் 3 முறை நீட்டிக்கப்பட கவண்டும். NPRS மற்றும் MTSS மதிப்சபண் கபான்ை விறளவு அளவீடுகள் தறையீட்டிற்கு முன்னும் பின்னும் அளவீடுகளாக இருக்கும்.

எஃபிலாராஜ் - எஃபிலாராஜ் என்பது ஒரு மசாஜ் நுட்பமாகும், இது சவவ்கவறு அளவு அழுத்தத்துடன் உடலில் பயன்படுத்தப்படும் நீண்ட, துறடத்தல் அல்ைது சறுக்கு பக்கவாதம் ஆகியவற்றை உள்ளடக்கியது. எஃபிலாராஜ் சபாதுவாக கதாலின்
கமற்பரப்பில் சறுக்கும் நீண்ட, தாள பக்கவாதம் அடங்கும். சிகிச்றசயாளரின் றகள் அல்ைது விரல் நுனிகள் வாடிக்றகயாளரின் உடலுடன் சதாடர்ச்சியாை சதாடர்றபப் பராமரிக்கின்ைை, சமன்றமயாை மற்றும் பாயும் இயக்கத்றத உருவாக்குகின்ைை. பக்கவாதம் சபாதுவாக இதயத்றத கநாக்கி இரத்த ஓட்டத்தின் திறசயில் பயன்படுத்தப்படுகிைது. மசாஜ் சதரபிஸ்ட்டின் எண்ணம் மற்றும் வாடிக்றகயாளரின் விருப்பங்கறளப் சபாறுத்து, ஒளி மற்றும் இனிறமயாைது முதல் உறுதியாை மற்றும்
ஆழமாை வறர மாறுபடும் அழுத்தத்துடன் எஃபிலாராஜ் சசய்ய முடியும்.

ஸ்கின் கராலிங்- ஸ்கின் கராலிங் என்பது மசாஜ் சிகிச்றச மற்றும் பல்கவறு உடல் கவறை நறடமுறைகளில் சபாதுவாகப் பயன்படுத்தப்படும் ஒரு றகமுறை சிகிச்றச நுட்பமாகும். இது சிகிச்றசயாளரின் விரல்கள் அல்ைது

றகளுக்கு இறடயில் கதால் மற்றும் அடிப்பறட திசுக்கறள சமதுவாக தூக்குதல் மற்றும் உருட்டுதல் ஆகியவற்றை உள்ளடக்கியது. இந்த நுட்பம் இயக்கத்றத கமம்படுத்தவும், சுழற்சிறய கமம்படுத்தவும், சமன்றமயாை திசுக்களில் பதற்ைம் அல்ைது ஒட்டுதல்களின் குறிப்பிட்ட பகுதிகறள குறிறவக்கவும் பயன்படுத்தப்படுகிைது.

சபட்ரிகசஜ்-- சபட்ரிகசஜ்- என்பது ஒரு மசாஜ் நுட்பமாகும், இது சமன்றமயாை திசுக்களில் பயன்படுத்தப்படும் பிறசதல், சுருக்க மற்றும் உருட்டல் இயக்கங்கறள உள்ளடக்கியது. சபாது மசாஜ் சிகிச்றசயில் சபட்ரிகசஜ் அடிக்கடி பயன்படுத்தப்படும் கபாது, தாறட பிளவுகளில் ஈடுபடும் தறசகளுக்கு அதன் பயன்பாடு தளர்றவ ஊக்குவிக்கவும், இரத்த ஓட்டத்றத கமம்படுத்தவும், தறச பதற்ைத்றத குறைக்கவும் பயனுள்ளதாக இருக்கும்.

நீட்டிப்புகளுக்கு இறடயில் 15 விநாடி இறடசவளியுடன் 3 முறை நீட்டிக்கப்பட கவண்டும். NPRS மற்றும் MTSS மதிப்சபண் கபான்ை விறளவு அளவீடுகள் தறையீட்டிற்கு முன்னும் பின்னும் அளவீடுகளாக இருக்கும்.

3. **பங்ககற்பாளரின் சாத்தியமான ஆபத்து**: இந்த ஆய்வில் எந்த ஆபத்தும் இல்றை.

4. **படிப்பின் பைன்**: இந்த ஆய்வின் மூைம் தனிநபர்கள் பயைடவார்கள்.

5. **பங்ககற்பாளருக்கு இழப்பீடு**: எகதனும் சாத்தியமாை அபாயங்களால் பாதிக்கப்பட்டால், ஆய்வின் கபாது அல்ைது முடிவில் இழப்பீடு வழங்கப்படும்.

6. ரகசியத்தன்லம: கநாயாளிகளிடமிருந்து சபைப்பட்ட தகவல்கள் பாதுகாப்பாக றவக்கப்படும் மற்றும் ஆராய்ச்சி கநாக்கங்களுக்காக மட்டுகம பயன்படுத்தப்படும்.

7. **ஆராய்ச்சியில் இருந்து விைகுவதற்கான பங்ககற்பாளர் உரிலம**: தனிநபர்கள் எந்த கநரத்திலும் ஆய்வுகறளத் திரும்பப் சபைைாம்.

8. ஆய்வு ரதாடர்பான புகார்கலள அவர்களிடம் ரதரிவிக்க கவண்டும்: ஆய்வு சதாடர்பாை ஏகதனும் புகார்கள் சிைப்பு சவர்டிககா கிளினிக்கின் மருத்துவப் சபாறுப்பாளரிடம் சதரிவிக்கைாம்

9. விரிவான தகவல் மற்றும் ரதளிவுபடுத்தல் ரபறைாம்: ராகுல் ர, UG, VII சசமஸ்டர், SCPT, SIMATS.

10. ராகுல் ர பங்ககற்பாளருக்கு கமகை உள்ள அறைத்து விவரங்கறளயும் சதளிவாக விளக்கியுள்ளார். பங்ககற்பாளரின் அறைத்து ககள்விகளுக்கும் விளக்கங்களுக்கும் முழுறமயாக பதிைளிக்கப்பட்டுள்ளது.

11. கததியுடன் பங்ககற்பாளரின் றகசயாப்பம்:

APPENDIX- H

Soft tissue mobilization group:

S.NO	**NPRS**		**MTSS Questionnaire**	
	Pre - Test	**Post-Test**	**Pre-Test**	**Post-Test**
1.	**5**	**3**	**7**	**6**
2.	**6**	**4**	**6**	**5**
3.	**4**	**3**	**6**	**5**
4.	**3**	**2**	**5**	**3**
5.	**3**	**2**	**6**	**5**

6.	4	2	4	3
7.	5	4	5	4
8.	4	3	3	2
9.	4	2	2	1
10.	4	3	2	1
11.	3	2	3	2
12.	5	3	4	3
13.	6	4	6	5
14.	5	4	7	6
15.	4	4	5	4
16.	6	4	8	7
17.	5	3	4	3

18.	6	5	5	4
19.	4	3	6	4
20.	5	4	7	6
21.	6	5	6	5
22.	3	2	5	4
23.	4	3	6	5
24.	5	4	7	6
25.	6	5	6	5
26.	3	2	7	6
27.	4	3	5	4
28.	5	4	6	5
29.	6	5	6	4
30. 35.	4	3	6	4
31. 36.	5	4	4	3
32. 37.	6	5	3	2
33.	4	3	7	6
34.	3	2	5	3

38.	**5**	**3**	**3**	**2**
39.	**4**	**2**	**5**	**4**
40.	**3**	**1**	**6**	**5**
41.	**3**	**1**	**6**	**4**
42.	**4**	**3**	**7**	**6**
43.	**5**	**3**	**7**	**6**
44.	**5**	**3**	**8**	**7**
45.	**3**	**1**	**5**	**4**

Stretching group

S.NO:	NPRS		MTSS Questionnaire	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1.	5	2	6	2
2.	4	1	5	2
3.	6	2	7	3
4.	4	2	6	3
5.	4	2	7	2
6.	4	2	4	1
7.	5	1	5	1
8.	5	3	3	1
9.	5	3	4	2
10.	5	2	2	0
11.	5	1	3	1
12.	6	4	4	1
13.	5	2	5	2
14.	4	3	5	2
15.	3	2	4	1
16.	4	2	4	1
19.	4	2	4	2
20.	5	3	3	1
21.	4	2	5	3
22.	5	3	4	1
23.	5	3	2	0
24.	5	2	3	1
25.	4	1	3	0

26.	6	4	3	1
27.	3	1	5	2
28.	5	2	6	2
29.	4	2	5	2
30.	5	3	6	1
31.	4	2	7	3
32.	5	2	5	2
33.	4	2	4	1
34.	5	2	2	0
35.	4	1	2	0
36.	4	2	3	2
37.	5	3	4	1
38.	4	2	5	1
39.	5	3	5	2
40.	3	1	4	1
41.	5	2	3	1
42.	4	2	2	1
43.	4	1	4	2
44.	5	2	5	1
45.	3	1	1	0