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Prevalence Of Medial Tibial Stress Syndrome In Athletes Undergoing Physical Test For Competitive Exam

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Abstract
Background: *Medial Tibial Stress Syndrome (MTSS) is called 'Shin splints', and 'Medial Tibial Traction Periostitis'. Pain along the tibia's posteromedial border happens after forceful exercise and training. Physical fitness tests have a fundamental role in competitive exams. As these tests have particular and hard eligibility criteria so candidates have to undergo intense physical training to pass the eligibility criteria. Because of hard physical training and short duration for preparation, this leads to overuse injuries like Medial tibial stress syndrome. Understanding the prevalence of MTSS in this specific athletic population is crucial for early identification, prevention, and management to enhance athletic performance and reduce the risk of overuse injury.*
Materials and method: *An observational study was conducted involving athletes preparing for physical fitness test as a part of competitive examinations. A Study was undertaken on 80 participants aged between 18 to 30 years in Satara district using a validated questionnaire and two special tests. The Data were collected using a self-administered questionnaire comprising Demographic information, training and physical activity, pain and injury history, and preventive techniques. The collected data were analyzed to determine associated risk factors and the prevalence of MTSS.*
Result: *According to the study, among 80 participants, 26% reported experiencing shin pain, indicating the prevalence of MTSS in athletes preparing for competitive exams. The study also showed that 69% of participants had increased their training intensity in the last two months, and 66% reported that their shin pain increased during activity.*
Conclusion: *The study found that MTSS is a severe challenge for athletes who are preparing for physical tests as a part of competitive exams. Therefore, it is crucial to implement preventive strategies, training modification, and effective recovery strategies. This allows participants to reduce their risk of developing MTSS and maintain long term physical performance.*
Keywords: *Medial Tibial Stress Syndrome, Shin Splints. MTSS, Overuse Injury, Competitive exams.*

INTRODUCTION:

Overuse Injuries are also called as "Overuse syndrome"[01]. In many sports, physical training, and competitive games, Overuse injuries constitute a significant difficulty, especially for people experiencing significant physical strain[02]. Overuse injuries appear to be more common among athletes. The primary root causes of overuse injuries are repetitive trauma and repetitive movements[03]. They are not acute but chronic injuries. Overuse injury develops over time due to the athlete's insufficient time allocation between performances for the body parts used in the repetition to recover. Overuse injury begins as small injuries, often due to poor techniques used by athletes and constant repetition of particular movements., and develop into larger injuries because athletes do not allow enough time to recover. Overuse injuries develop in stages starting from pain after physical activity and going till chronic pain even at rest[04].

Overuse injuries include soft tissue injuries like tennis elbow and hard tissue injuries like stress fractures. Stress fracture is mainly caused when the condition is not treated early and it may lead to chronic discomfort. Repetitive movements, insufficient recovery time between practice sessions, less biomechanical knowledge of the sport, training mistakes and errors, muscle weakness and imbalance, use of inappropriate footwear, no sound knowledge of preventive measures, sudden increases in activity, absence of stretching, lack of flexibility movements, poor postural alignment and position, frequent change in the surface from soft to hard, and insufficient warm-up and cool-down time between two practice sessions include all risk components for overuse injuries[05].This all things can reduce the player's performance. Among athletes, Among the common and widespreadoveruse injuries is medial tibial stress syndrome (MTSS)[06].

Medial Tibial Stress Syndrome(MTSS) is called 'Shin splints' and 'Medial Tibial Traction Periostitis'. Pain along the tibia's postero medial border that happens after forceful exercise and training is known as medial tibial stress syndrome(MTSS)[07]. It is the primary reason for leg pain and discomfort while doing the athletic/ physical activity. Likelihood of developing MTSS[Medial tibial stress syndrome] is significant in a person if they regularly engage in activities like running, sprinting, jogging, and leaping. People are significantly more at risk if they have

underlying co-morbid disorders such as osteoporosis and other condition like Vitamin D deficiencies and overweight[08]. Runners and athletes who train more than 05 times/week are at a greater chance of developing MTSS compared to the general population[09].

Anatomy and Biomechanics

When examining the condition from an anatomical perspective, we can observe that the bones, muscles, fascia, tendons of the lower limb are the primary areas affected by MTSS (medial tibial stress syndrome). The tibia is the primary bone and the first element affected by medial tibial stress syndrome (MTSS). Repetitive stress causes inflammation of the periosteum, which leads to periostitis. Repetitive strain disproportionately affects muscles including the flexor digitorum longus, soleus, tibialis anterior, and tibialis posterior muscle. Deep crural fascia near the tibia also gets inflamed because of increased pressure due to repetitive movement near the lower tibial 1/3rd [10]. Tendons of the tibialis posterior muscle pull the muscle causing localized pain in the area. The condition may potentially affect the bone marrow if not addressed over an extended period. Biomechanical abnormalities such as flat feet, inappropriate footwear, inadequate rest in between training sessions, exercising on hard surfaces like concrete, and weak calf muscles are remarkable Risk factors for developing medial tibial stress syndrome. because of variations in hormones and bone density, Women have a higher statistical likelihood of developing MTSS(medial tibial stress syndrome) compared to men [05,11].

Physiological

Physiologically the MTSS develops through the repetitive stress and strain of high volume and high intensity exercises which are done in short period without allowing enough recovery time[12]. At the location of the repeated stress or strain microtrauma and microfracture may occur naturally [13]. Inflammatory chemicals like interleukins and tumor necrosis factor alpha are released as a result of this microdamage to the surrounding structure [14]. Additionally, repetitive movements cause microtears in the surrounding muscles. Muscles such as the tibialis anterior and posterior muscles, which results in inflammation. Inflammation caused by this microdamage and microtrauma gives rise to localized pain and sometimes swelling [13]. The pain is dull aching and persistent along lower 1/3rd of the tibia. Initially, the Pain is only present during the movement or during physical activity of the athletes but as the condition worsens the pain and discomfort may feel even at rest, and discomfort is felt during normal activities of daily living [15]. The pain gradually increases with activity/exercise and gets relieved after taking rest or medications [05]. If left unmanaged for an extended time without taking the preventive measures it may lead to stress fractures [08] and can impact a player's physical ability and overall performance and may lead to disqualification also [06].

Athletes and Competitive exam

Physical fitness tests have a fundamental role in competitive exams, like those for the National Defence Academy (NDA), Combined Defence Services (CDS), Central Armed polices(CAPF), and various defence related positions[16]. These assessments are typically conducted to measure the candidate's Speed, Endurance and Strength. The nature of this test is required to check the candidate's ability to pass the test and be eligible for the post they are willing[17]. As these tests have particular and hard eligibility criteria so candidates have to undergo intense physical training to get pass the eligibility criteria[16,17]. Because of hard physical training and short duration for preparation, this leads to overuse injuries like Medial tibial stress syndrome[06].

This has various consequences like- Chronic pain, Chronic discomfort, Stress fracture[18] and in some cases it may also lead to disqualification from the tests. Study shows mainly 15 to 20% of the participants undergoing the physical test as a part of a competitive exam experience pain in the shin and it affects their performance. It was found that competitive exam candidates often train intensely 5–6 times per week[09]. This may increase physical and mental stress[16]. Many athletes don't have sufficient recovery time and repetitive training makes them more susceptible to prone for Medial tibial stress syndrome than an average person[05].

MATERIALS AND METHODOLOGY:

The study was observational type of study with 80 participants conducted in Satara district, Maharashtra. The study duration was about 6 months. The review was conducted with the approval of Ethical committee of the institution where the study was conducted. By reviewing the inclusion and exclusion criteria of the participant, the sample population was selected. The participants were told about the study and consent form was taken from them regarding the study. Questionnaire was distributed to participants through google forms. Participant's responses to the question were then recorded.

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RESULT:

This survey study aimed to assess the prevalence of MTSS in individuals undergoing physical training for competitive exams. The inclusion and exclusion criteria were followed in the conduct of this study. These attendees were given access to a validated questionnaire through an online Google form. The Questionnaire Was Used to assess the prevalence of Medial Tibial Stress Syndrome in athletes undergoing physical tests for competitive exams. There were 15 questions, and responses were obtained by asking participants about their training routines, Activity history, injury history, Type Of training surface used, and recovery Methods.

Data:

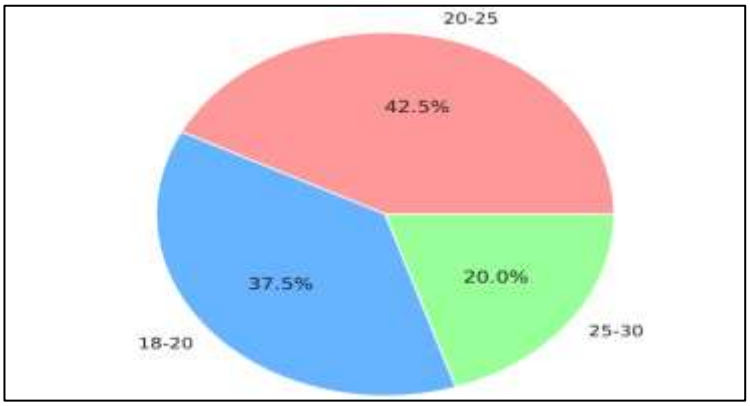

Figure No. 01: Age Group Distribution

Interpretation: Most participants (42%) are between 20-25 years, followed by 18-20 years (38%).

Figure No. 02 : Dominant Leg Distribution

Interpretation: The majority (77%) have a dominant right leg, while 12% are left-dominant.

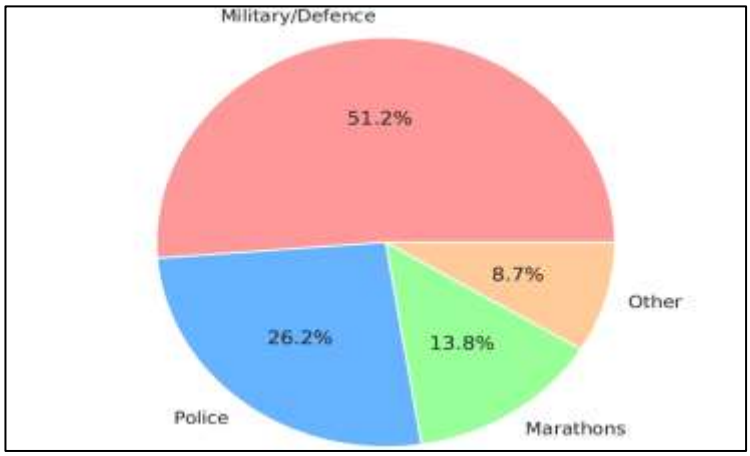

Figure No. 03: Physical Test Type

Interpretation: Military/Defence (51%) is the most common test participants are preparing for.

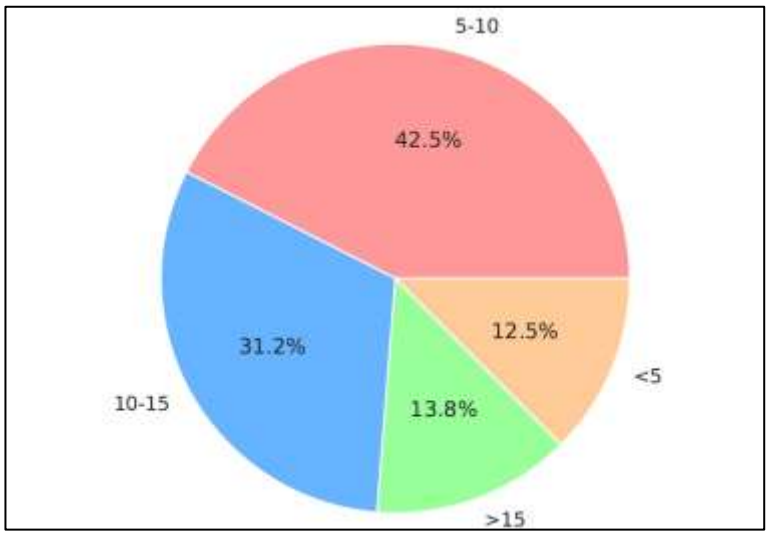

Figure No. 04: Training Hours Per Week

Interpretation: Most participants (42%) train between 5-10 hours per week.

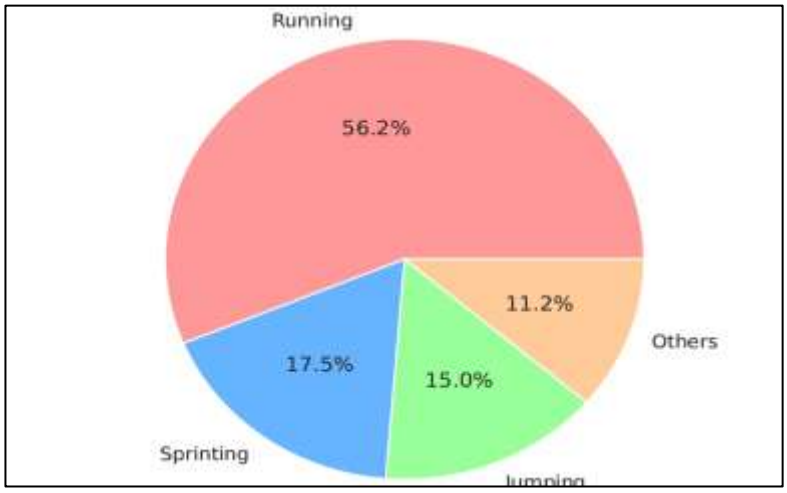

Figure No. 05: Training Type Distribution

Interpretation: Running (56%) is the most common training type, followed by sprinting (17%).

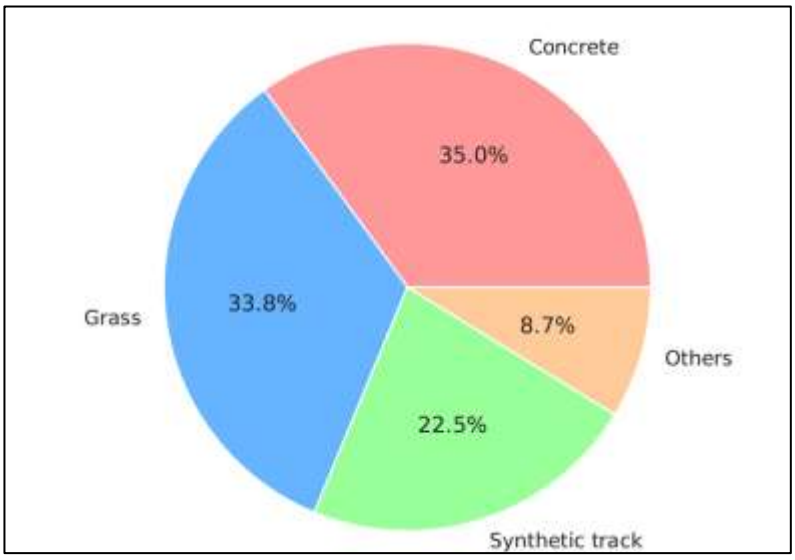

Figure No. 06: Training Surface Distribution

Interpretation: Concrete (35%) and grass (34%) are the most frequently used training surfaces.

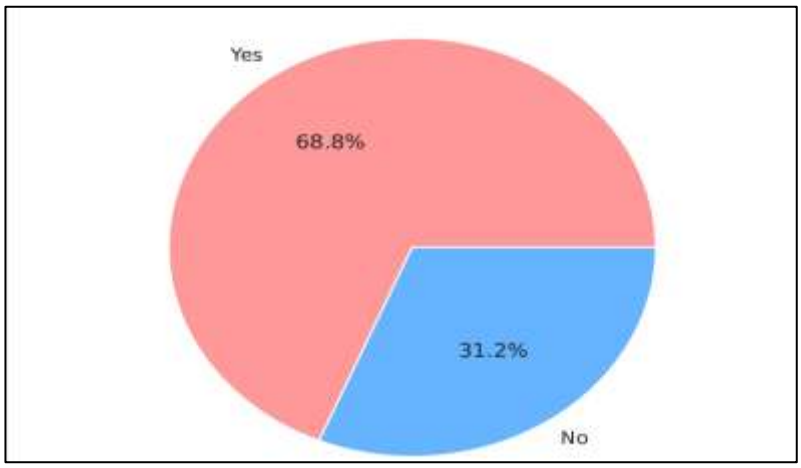

Figure No. 07: Increased Training Intensity in the Last 2 Months
Interpretation: 69% of participants increased their training in the last 2 months.

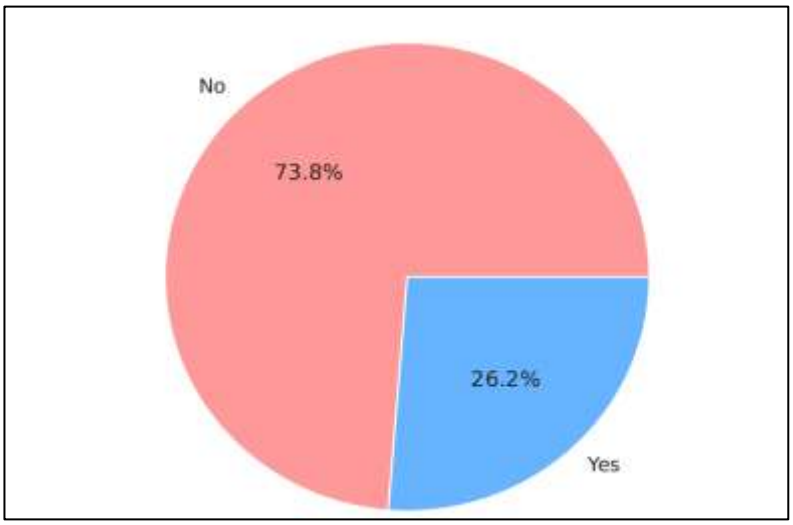

Figure No. 08: Shin Pain Occurrence
Interpretation: Only 26% of participants reported experiencing shin pain.

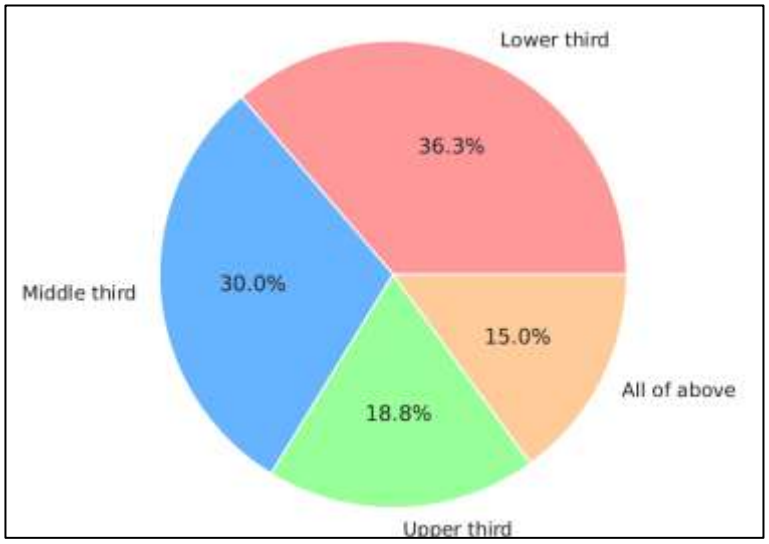

Figure No. 09: Pain Location Distribution
Interpretation: Lower third (36%) and middle third (30%) are the most common shin pain areas.

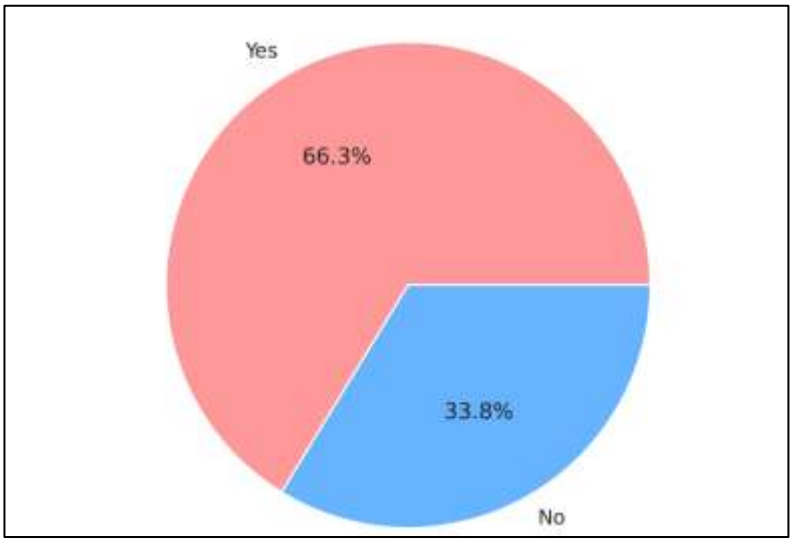

Figure No. 10: Pain Increases During Activity

Interpretation: A high percentage (66%) report that their shin pain increases with activity.

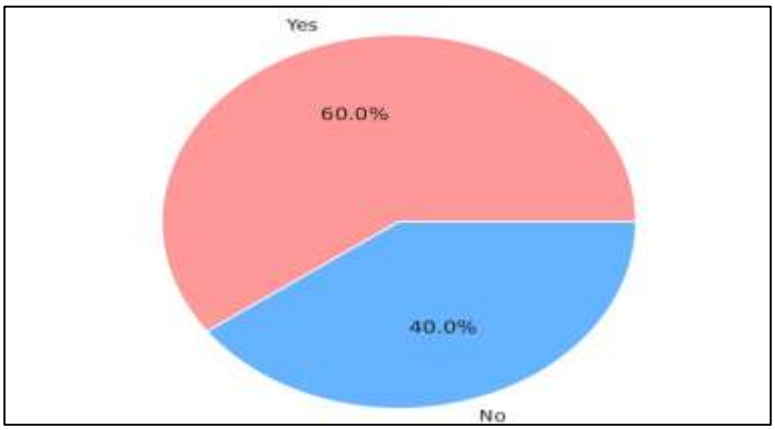

Figure No. 11: Stretching Before Workout

Interpretation: Most participants (60%) stretch before workouts.

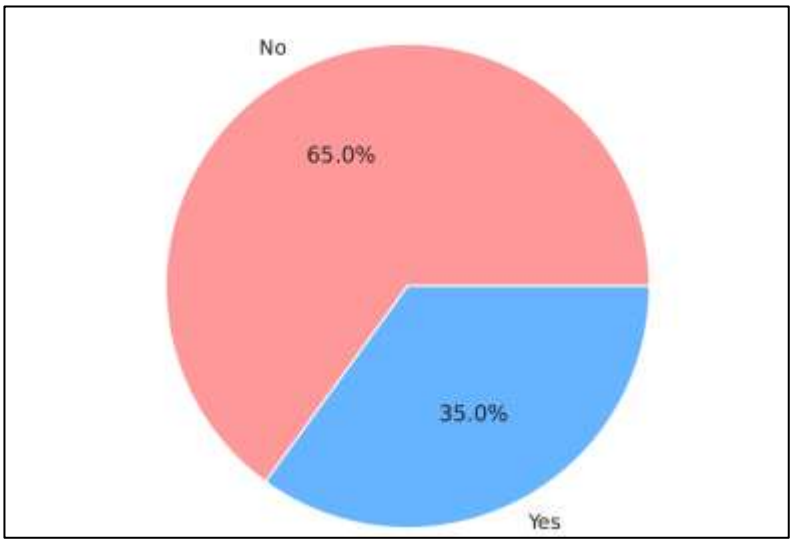

Figure No. 12: Break Taken Due to Shin Pain

Interpretation: 35% of participants had to take breaks due to shin pain.

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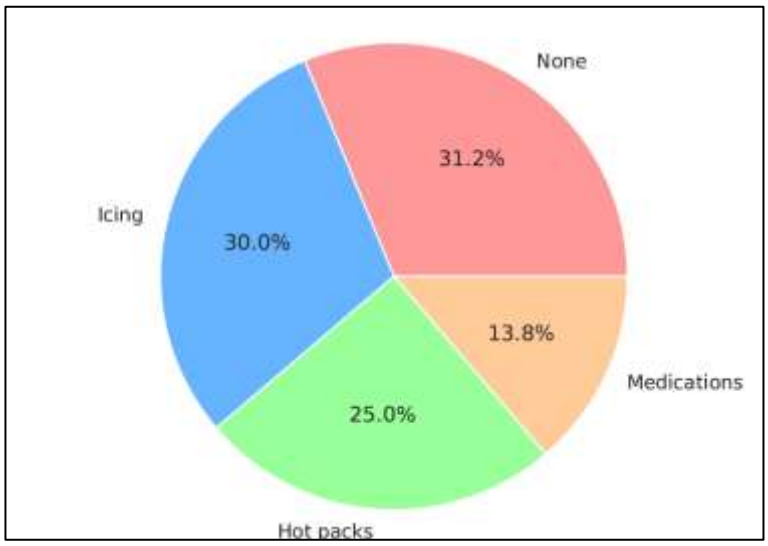

Figure No. 13: Recovery Methods Used

Interpretation: About 31% do not follow any recovery methods, while icing (30%) is the most preferred method. Two Special Tests Were Used To Help Confirm The Medial Tibial Stress Syndrome (MTSS),

Special Tests Performed,
1] Medial Tibial Palpation Test.
2] Single Leg Hop Test.

These Were Interpreted As Positive (YES) and Negative (NO).

Special Tests	Positive (YES)	Negative (NO)	Percentage Positive(%)
Medial Tibial Palpation Test	59	21	73.75%
Single Leg Hop Test	53	27	66.25%

DISCUSSION:

This survey sought to determine how common MTSS is in individuals undergoing physical training for competitive exams. One of the most frequent and notably common overuse injuries is medial tibial stress syndrome among athletes who engage in high-impact activities. As the study has objectives of identifying the prevalence rate of MTSS among athletes undergoing training for physical tests, To analyze and examine common risk factors linked to the development of MTSS in this population, and to assess how training intensity and methods affect the occurrence of Medial Tibial Stress Syndrome (MTSS).

The study was conducted in Satara district, which concluded that 26% of the participants experienced shin pain and discomfort while training, especially during weight bearing activities, indicating a high prevalence rate of MTSS among this population. A study of the location of pain showed that the lower third of the shin and middle third of the shin were the most commonly affected areas. These results align with prior research suggesting that repetitive stress on the tibia, especially in activities such as running and sprinting, leads to microtrauma and inflammation of the periosteum, which further leads to Periostitis.

Among this population group, 43% of participants involved in sprinting activities; among the various training types and activities, sprinting emerged as the most associated with shin pain and shin discomfort during training. This can be attributed due to the high-impact forces exerted on both lower extremities during rapid acceleration and deceleration movements/Activities. Also running (20%) and jumping (25%) contributed to shin pain but at comparatively lower rates. The training surface has a significant impact on the incidence of injuries. Shin pain and soreness were more common among athletes who trained on synthetic tracks (28%) and concrete (29%) than on grass (22%). Inadequate shock absorption from hard surfaces, such as concrete and synthetic tracks, puts more stress on the tibia and surrounding musculature.

In this study, Training duration and intensity were additionally assessed as contributing risk factors. A key contributor to the development of MTSS may be the sudden increase in training without sufficient conditioning and inadequate recovery time. Among 69% of the participants from the study reported a sudden increase in

training intensity and duration in the past two months. Overuse injuries like MTSS often occur when the body is not given enough time to adapt to higher mechanical demands, and no time is given to recover completely.
A shocking finding was that among all the participants, 60% of participants reported doing stretching regularly before training sessions, yet the prevalence rate of MTSS remains significant and high. This implies that incorrect stretching techniques or skipping active warm-up contribute to Shin pain and discomfort rather than preventing it. Participants used a variety of recovery techniques and methods. Icing is the most preferred (31%) recovery method used by the participants. However, 31% of participants did not follow any recovery protocol/regimen, which possibly prolonged the injury or aggravate the symptoms. To prevent and treat MTSS, appropriate recovery methods such as Strength training, Modification, and appropriate footwear selection and load management are essential.
In summary, the findings indicate that the incidence rate of MTSS significantly correlates with training intensity, surface type, and particular repetitive activities/Movements. To lower the occurrence of MTSS in this population, the results highlighted the need for Structured Preventive strategies, including proper warm-up sessions, progressive load training, modification of footwear and a Change in training surface.

CONCLUSION:

Based on the results of this study, It was found that MTSS is a severe challenge for athletes who are preparing for physical test as a part of competitive exams. According to the participants report, Middle third and Lower third of the shin were most commonly affected areas (26%). A key Contributor to the development of MTSS may be the sudden increase in training without sufficient conditioning and inadequate recovery time, Training on hard surfaces like concrete and synthetic track (31%), High-impact Activities like sprinting (43%) and running (20%), Lack of structured recovery Methods/Technique.
Therefore, it is crucial to implement preventive strategies such as Gradual training progression to allow the body to recover and adapt the changes, Training modifications such as using softer surfaces like grass and use of proper footwear, strengthening exercises to improve muscle endurance and to reduce Stress on tibia and surrounding musculature, Effective recovery strategies including Rest, Icing and Proper Stretching Protocol. This allows participants to reduce their risk of developing MTSS And maintain long term physical performance.

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