

## Prevalence and Associated Risk Factors of Medial Tibial Stress Syndrome among Cadets -A Cross-Sectional Study

Author : Surbhi Singh  
Dr Sumera khan  
Address: Galgotias university

---

### Abstract

*Introduction: Context: The context of the study is to find out associated risk factors in NCC cadets age between 18 to 25 years*

*Objective: To inspect proportion of cadets associated with risk factors of Medial tibial stress syndrome.*

*Design: Cross sectional study*

*Setting: The research has taken place on university ground were all cadets assembled.*

*Participants: G 164 cadets all girls age above 18 years and between 25 has participated.*

*Main outcomes measure: The outcome showed 45% of cadets having pain after continues training for 2 hrs were severity of pain varied between mild to moderate while there were 51% cadets showing pain in foot. As well as was found positive for one leg hop test*

*Results: The result show that symptoms and risk factor associated with medial tibial stress syndrome are more common in above age of 20 years which is 20.6 % and less in below age group that corresponded to only 1.3%.*

*conclusion: Conclusion: medial tibial stress syndrome can be mis diagnosed with other factors such as muscle strength, any tendinopathy and compartment syndrome therefore one leg hop test can only be one of the tools to assess risk factor but cannot provide exact diagnose of the*

*syndrome. imaging technique should be used before confirming the diagnose.so this research can be further continued with a greater number of cadets and in large areas and with more tools for examination.*

**Keywords:** Medial tibial stress syndrome

One leg hop test

Tendinopathy

Compartment syndrome

---

Date of Submission: 01-05-2025

Date of Acceptance: 11-05-2025

---

### I. Introduction

one of the most prevalent worn-out conditions in runners is known as medial tibial stress syndrome (MTSS), which is characterized by leg pain and disturbance as a result of repetitive pressure [1,3,5]. Medial tibial periostitis is a condition that is frequently associated with inflammatory traction, which is a more complex phrase that better accurately characterizes the situation. Pain that occurs frequently in the proximal or medial third of the tibia's distal third is used to diagnose shin splints. There may occasionally be medial, lateral, anterior, or posterior pain as well [1]. Shin splints, another name for the pain felt around the shinbone and tibia, are a result of the localized inflammation of the tissue. This is often referred to as MTSS (medial tibial stress syndrome). More particular, those who are in the military, dancers, and runners are all susceptible to acquiring shin splints. The pain in the knee extension mechanism, Achilles tendon inflammation, iliotibial band syndrome, Achilles bursitis, irritation in the metatarsal arch, stress fractures of the tibia, and plantar fasciitis are the most common overuse symptoms of medial tibial stress syndrome. [2] Medial Tibial Stress Syndrome (MTSS, also known as Shin Splints), which affects 35% of military people, is quite prevalent, according to the prevalence data. [3] The discomfort felt along the lower two thirds of the tibia that is not brought on by a fracture is known as medial tibial stress syndrome(MTSS), which is a repeated injury that occurs in cadets as a result of high-intensity training sessions that are completed quickly. Boots (foot wear) used during high-intensity workouts that have an impact on exercise have resulted to a higher incidence of MTSS in cadets compared to the general population. High stress situations with pressure can also contribute to the development of MTTs in cadets.[4]. The constant discomfort in the lower limb is referred to as a shin splint. Based on the type of incidence, there are two different forms of shin splints. a) dysfunctional anterior leg compartment or nearby structures can cause anterior shin splints, which

are painful. b) Pain during activity in the distal two-third of the leg is attributed to medial tibial stress syndrome [5]. When the bending force on the tibia exceeds the strength of the other leg, MTSS is taken into account [1].

## II. Methodology

We did cross-sectional study on national cadet corps in galgotias university greater Noida Uttar Pradesh. Where we selected participant through convenience sampling method and estimated sample size using epitool software, that was 81 but we got 134 participants. we excluded participant on the basis of exclusion criteria that we set. cadets not coming under the age group of 18 to 25 years, any cadets who are not active have been excluded and the cadets who are actively participating and are coming in age group of 18 to 25 years have been included, the objective of us study is to determine the percentage of cadets at a risk of developing MTSS. the study has been held for a month on December 2022. cadets have been called for the meet up at university where they have been acknowledged about the objective and its procedure, we divided the study into phases. phase 1; educating and consent, phase 2; assessment Phase 3; special diagnosed which was done through one leg hop test. research took place onsite and with approval from research department of galgotias university. all cadets participated in research were from galgotias university perusing other courses and taking NCC training from the NCC department of the university.

Phase 1; This phase included enlightening cadets about the MTSS and associated risk factors, this was a one-day program that was held in college conference room on December 6th 2022. around 200 cadets participated in this program out of which 164 cadets filled the consent form for the further procedure of research. The discussion took for 3 hrs.

Phase 2; This phase continued with the assessment that included pain assessment its severity and consistency. the documentation has been taken by us. chief complain of the subject has been noted, then observation of foot arch, gait pattern, dynamic and stable posture has been taken into consideration. The assessment has been taken for 1 week 6 hours each day from 7th December to 14th of December 2022 in college premises.

Phase 3; This phase lasted from 22nd December to 31st of December for 2 hours each day. The target we set was to assess 15 cadets each day but due to absence 2 cadets were assessed separately. the objective of this phase was to perform single leg hop test to confirm MTSS and associated risk factors.

## III. Results

number of participants in this study are 134. and from this study we found that there are 34 % cadets who are at a risk of developing MTSS. We have found that age has been a factor as we grow older there are so many factors that externally or internally effects are health. our body metabolism also keeps changing, that can be reason to effect are bones and soft tissue.

here is the table below (table 1.1) that shows significant impact of age on MTSS. Pain is a common symptom among individual but the type of pain varies among individual having different condition. Below (chart 1.1) is a distribution of leg pain among cadets during continuous training There are 52.4 % cadets who confirmed that they have pain during continuous training, 15.5% of cadets were not sure about the pain if they have due to training or not and only 32.1% had no pain after training. Based on one leg hop test there were 34 % cadets at risk of MTSS that means out of 134 cadets, 45 cadets are at risk of developing MTSS. below is graph showing the variation (graph 1.1)

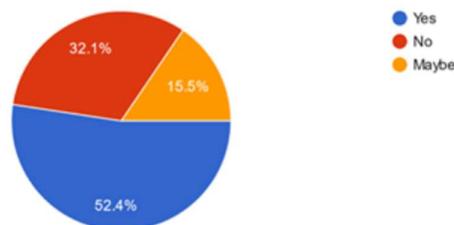


Figure 1: chart 1.1

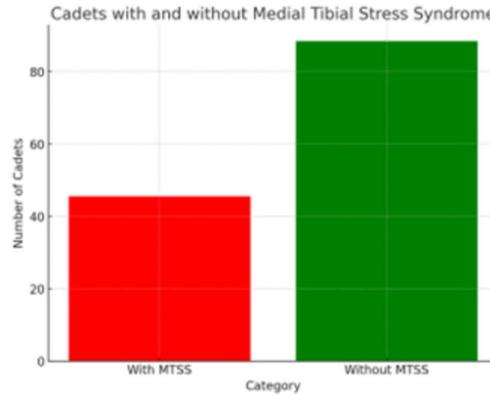


Figure 2: graph 1.2

Tables

Age	% distribution
Between 18-19	1.3 %
Between 20-21	6.6 %
Between 21-22	10.7%
Between 23-25	15.5%

**IV. Discussion**

The aim of this study is to find out proposition of cadets at a risk of medial tibial stress syndrome. so from the study we concluded that the percentage of cadets who are at the risk of MTSS are 34 % means out of 134 cadets 45 cadets are at the risk. The severity of pain among cadets varied from mild to severe, 13.3% cadets had mild pain 14.7% had moderate pain and 6.7% had severe pain. we also found the older age group was affected more, about 15.4%. becker james has also concluded in her study that females are more prone in developing MTSS that is about 55.3% then male which is about 44.7 % .the authors also says that the repetitive stress is a factor of microtrauma of periosteum (2) Campbell states that cadets’ shoes while training can be a factor of MTSS as Boots (foot wear) used during high intensity workout training has a impact on exercise and can result to a higher incidence of MTSS in cadets compared to the general population.

**V. Conclusion**

The study brought the insight of high risk of MTSS among cadets. this study will help in further investigation of MTSS among different states and nation conducting NCC training This will also help in improvising training programs and modifying it for the benefit of the cadets from preventing MTSS

**Reference**

- [1]. Akuzawa, H., Oshikawa, T., Nakamura, K., Kubota,R., Takaki, N., Matsunaga, N., & Kaneoka, K. (2022). Difference in the foot intersegmental coordination pattern between female lacrosse players with and without a history of medial Tibial stress syndrome; across-sectional study. *Journal of Foot and Ankle Research*, 15
- [2]. <https://doi.org/10.1186/s13047-022-00513-y>Becker, J., James, S., Wayner, R., Osternig, L., & Chou, L. S. (2017). Biomechanical Factors Associated with Achilles Tendinopathy and Medial Tibial Stress Syndrome in Runners. *American Journal of Sports Medicine*, 45 (11), 2614–2621.
- [3]. Campbell, J. (2018). An Exploratory Study of Military Management Practices, Physical An Exploratory Study of Military Management Practices, Physical activity, and the Prevalence of Shin Splints in ROTC Cadets activity, and the Prevalence of Shin Splints in ROTCCadets. <https://dc.etsu.edu/etd>
- [4]. <https://doi.org/10.7759/cureus.26676> Dingenen, B., Truijen, J., Bellemans, J., & Gokeler, A. (2019). Test–retest reliability and discriminative ability of forward, medial and rotational single-leg hoptests. *Knee*, 26 (5), 978–987.
- [5]. <https://doi.org/10.1016/j.knee.2019.06.010>Edama, M., Onishi, H., Kubo, M., Takabayashi, T.,Yokoyama, E., Inai, T., Watanabe, H., Nashimoto, S.,Koga, Y., & Kageyama, I. (2017). Gender differences of muscle and crural fascia origins in relation to the occurrence of medial tibial stress syndrome. *Scandinavian Journal of Medicine and Science inSports*, 27 (2), 203–208.
- [6]. <https://doi.org/10.1111/sms.12639> Franklyn, M., & Oakes, B. (2015). Aetiology and mechanisms of injury in medial tibial stress syndrome: Current and future developments. In *World Journal of Orthopaedics* (Vol. 6, Issue 8, pp. 577–589). Baishideng Publishing Group Co.
- [7]. <https://doi.org/10.5312/wjo.v6.i8.577> Hamstra-Wright, K. L., Bliven, K. C. H., & Bay, C. (2015). Risk factors for medial tibial stress syndrome in physically active individuals such as runners and military personnel: A systematic review and meta-analysis. In *British Journal of Sports Medicine* (Vol. 49, Issue 6, pp. 362–369). BMJ Publishing Group.

- [8]. <https://doi.org/10.1136/bjsports-2014-093462>Mattock, J. P. M., Steele, J. R., & Mickle, K. J. (2021). Are Leg Muscle, Tendon and Functional Characteristics Associated with Medial Tibial Stress Syndrome? A Systematic Review. In *Sports Medicine- Open* (Vol. 7, Issue 1). Springer Science and Business Media Deutschland GmbH.<https://doi.org/10.1186/s40798-021-00362-2>
- [9]. Menéndez, C., Batalla, L., Prieto, A., Rodríguez, M.A., Crespo, I., & Olmedillas, H. (2020). Medial tibial stress syndrome in novice and recreational runners: A systematic review. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 20, pp. 1–13). MDPI AG.
- [10]. <https://doi.org/10.3390/ijerph17207457> Milgrom, C., Zloczower, E., Fleischmann, C., Spitzer, E., Landau, R., Bader, T., & Finestone, A. S. (2021). Medial tibial stress fracture diagnosis and treatment guidelines. *Journal of Science and Medicine in Sport*, 24 (6), 526–530.
- [11]. <https://doi.org/10.1016/j.jsams.2020.11.015> Naderi, A., & Bagheri, S. (2023). A Review of the Therapeutic and Protective Effects of Kinesio Taping and Foot Orthosis in Patients With Medial Tibial Stress Syndrome. *Scientific Journal of Rehabilitation Medicine*, 12 (1), 2–17.
- [12]. <https://doi.org/10.32598/SJRM.12.1.13> Negrete, R., Simms, S., Gross, J., Rabello, L. N., Hixon, M., Zeini, I. M., Jenkins, W. L., & Davies, G. J. (2021). The test re-test reliability of a novel single leg hop test (T-Drill hop test). *International Journal of Sports Physical Therapy*, 16 (3), 724–731.
- [13]. <https://doi.org/10.26603/001c.23677> Ohmi, T., Aizawa, J., Hirohata, K., Ohji, S., Mitomo, S., Ohara, T., & Yagishita, K. (2023). Biomechanical characteristics of the lower extremities during running in male long-distance runners with a history of medial tibial stress syndrome: a case control study. *BMC Musculoskeletal Disorders*, 24 .
- [14]. <https://doi.org/10.1186/s12891-023-06216-0> pakeeza seermal. (2023). Investigation of Prevalence and Association of Targeted Risk Factors of Shin Splints in Recreational Treadmill Runners of Sargodha, Pakistan. <http://www.xtgcydzjs.com> PATEL, PRINA. Y., & PATIL, N. (2020). PREVALENCE OF SHIN SPLINT IN RECREATIONAL MARATHON RUNNER. *International Journal of Physiotherapy*, 7 .
- [15]. <https://doi.org/10.15621/ijphy/2020/v7i1/193672> Pulsone, R., & Williams, C. (2022). Medial Tibial Stress Syndrome and Female Military Recruits. *Health*, 14 (03), 273–280.
- [16]. <https://doi.org/10.4236/health.2022.143021> Rai, Dr. S., Raman, Dr. V., Varma, Dr. R., & Mohanty, Dr. C. (2017). Hyperbaric oxygen therapy: An effective conservative treatment in medial tibial stress syndrome. *International Journal of Orthopaedics Sciences*, 3 (1h), 534–536.
- [17]. <https://doi.org/10.22271/ortho.2017.v3.i1h.79> Sammito, S., Hadzic, V., Karakolis, T., Kelly, K. R., Proctor, S. P., Stepens, A., White, G., & Zimmermann, W. O. (2021). Risk factors for musculoskeletal injuries in the military: a qualitative systematic review of the literature from the past two decades and a new prioritizing injury model. *Military Medical Research*, 8 .
- [18]. <https://doi.org/10.1186/s40779-021-00357-w> Sharma, J., Weston, M., Batterham, A. M., & Spears, I. R. (2014). Gait retraining and incidence of medial tibial stress syndrome in army recruits. *Medicine and Science in Sports and Exercise*, 46 (9), 1684–1692.
- [19]. <https://doi.org/10.1249/MSS.0000000000000290> Thong, I. S. K., Jensen, M. P., Mir'o, J., & Tan, G. (2018). The validity of pain intensity measures: What do the NRS, VAS, VRS, and FPS-R measure? *Scandinavian Journal of Pain*, 18 (1), 99–107.
- [20]. <https://doi.org/10.1515/sjpain-2018-0012> <https://doi.org/10.1515/sjpain-2018-0012> to appear in the reference list.