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Original article

Prevalence of medial tibial stress syndrome in university students

Prevalência da síndrome de estresse tibial medial em estudantes universitários

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ABSTRACT

Introduction: Medial Tibial Stress Syndrome can be defined as pain along the posteromedial edge of the tibia that occurs during exercise. Its incidence can reach 35% in military and athletes. **Objective:** The study aimed to show the prevalence of the syndrome in students of Physical education and Physical therapy courses at UFES. **Methods:** A cross-sectional study was carried out on 141 students. All students answered a questionnaire about personal data, level of physical activity and clinical history of the syndrome. A physical exam was performed for those who presented with compatible clinical history. If it were positive, it would be suggestive that the student had the syndrome. **Results:** Our results demonstrate no significant differences between the prevalence of syndrome between courses, gender and the volume of physical activity between groups with and without the syndrome. The activity with the most reported by the positives was weight training. **Conclusion:** We conclude that possibly extrinsic factors such as volume and type of physical activity are less linked to the emergence of medial tibial stress syndrome.

Keywords: medial tibial stress syndrome; exercise; pain; physical therapy specialty; physical education and training.

RESUMO

Introdução: A Síndrome do estresse tibial medial pode ser definida como dor ao longo da borda posteromedial da tíbia que ocorre durante o exercício, sua incidência pode chegar a 35% em militares e atletas. **Objetivo:** Mostrar a prevalência da síndrome do estresse tibial medial nos estudantes dos cursos de Educação Física e Fisioterapia da Universidade Federal do Espírito Santo, e as características de gênero, tipo e volume de atividade física e o curso matriculado dos alunos acometidos pela síndrome. **Métodos:** Trata-se de um estudo transversal, no qual foram incluídos um total de 141 estudantes, todos responderam um questionário com perguntas sobre dados pessoais, nível de atividade física e história clínica da síndrome. Naqueles que apresentaram história clínica compatível foi realizado um exame físico, caso fosse positivo o participante era diagnosticado com a síndrome. **Resultados:** Não houve diferenças significativas entre a prevalência de síndrome entre os cursos, entre sexos, e nem correlação com o volume de atividade física praticado. A atividade mais relatada pelos indivíduos com a síndrome foi a musculação. **Conclusão:** Os fatores extrínsecos como volume e tipo de atividade física não estão associados a síndrome do estresse tibial medial.

Palavras-chave: síndrome do estresse tibial medial; exercício físico; dor; especialidade de fisioterapia; educação física e treinamento.

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Introduction

Medial Tibial Stress Syndrome (MTSS) can be defined as pain along the posteromedial border of the tibia that occurs during physical exercise. For its confirmation, the presence of pain in an extension of at least 5 centimeters in this region is necessary. This is one of the most common overuse injuries in sports orthopedics, with an incidence of between 4 and 35% in military populations and athletes [1].

Although its etiology is unknown, there are several theories about its cause, including periostitis caused by muscles, local bone lesions due to overload, and fasciitis [2]. About its incidence, we can mention increased internal and external rotation of the hip, high body mass index, and decreased calf perimetry, in addition to being more prevalent in females [3,4]. Thus, the understanding of MTSS is limited, and the elaboration of interventions for its treatment or prevention is reduced [5].

The association between sports practice and MTSS incidence is a subject that has been extensively studied in the literature. Although there is still no absolute evidence about the characteristics of physical activity and the incidence of MTSS, it is believed that it is more common in activities with repetitive effort and impact, such as running or jumping [7]. A study by Yates et al. [1] observed that running was reported as the activity causing pain in 66% of individuals. A study carried out in 2018 with Physical Education (PE) students showed an incidence of MTSS ranging from 0-12% and a prevalence of 5-15%. The authors attributed these results to the high load of practical classes in this course, as well as the high level of sports practice among PE students [6].

Taking into account the ease of recruiting and obtaining data, our study was carried out with university students. We investigated the prevalence of MTSS in Physical Education and Physiotherapy students at the Universidade Federal do Espírito Santo (UFES). The objective of our study was to investigate the prevalence of MTSS among students of PE and Physical Therapy courses, to observe the behavior of intrinsic and extrinsic factors that are associated with MTSS, and to describe the characteristics of the practice of physical exercise between these two groups of students that may explain this prevalence of MTSS.

Methods

Study design

An analytical cross-sectional study was carried out, in which the objects of study were students from the Universidade Federal do Espírito Santo (UFES) in the PE and Physiotherapy courses, regardless of the period. In this population, we studied the presence of MTSS, as well as other intrinsic and extrinsic factors.

Scenery

The interviews took place near the UFES campuses, with Physiotherapy students interviewed at the Health Sciences Center and Physical Education students at

the Physical Education and Sports Center, both located in Vitória, ES. Approaches took place from 04/01/2020 to 08/31/2020. Data collection and physical examination were performed in a single meeting.

Participants

A total of 141 students were included in the study, of which 68 were from the Physical Therapy course and 73 from the PE course. As an exclusion criterion, any sign of other pain-causing lesions that could be confused with MTSS, such as paresthesia, edema and fracture history, was defined. This study was approved by the Human Research Ethics Committee of the Universidade Federal do Espírito Santo (3,367,411). All participants were informed about the study protocol and signed an informed consent form accepting to participate in the study.

Questionnaire

Students included in the study answered an anamnesis that addressed questions about gender, age, education, lower limb dominance, participation in physical activity, presence of MTSS, and impact of MTSS on their physical activities.

Physical exam

The physical examination to confirm the diagnosis of MTSS consisted of palpation of the region of the posteromedial border of the tibia (with the participant sitting with double flexion of 90 degrees) and considered positive when the referred pain was in an extension greater than or equal to 5 cm (Figure 1) [8].

Figure 1- Physical examination

Variables

The main variable investigated was the presence of MTSS. Secondly, the types and volume of activity practiced. It was expected that participants considered positive for MTSS would practice activities of higher impact and would have a greater volume of exercises. Participants who tested positive in the previously explained physical examination or had a previous medical diagnosis were considered to have MTSS.

Statistical analysis

Data are presented as mean ± standard deviation or as frequency and percentage. For statistical analyses, Student's t-test was used for continuous variables and Fisher's exact test for contingency data. A statistically significant difference was considered when $p < 0.05$.

Results

Table I shows the general characteristics of the study participants. Among the 141 students included in the study, according to the diagnostic criteria adopted, 18 students had MTSS, which is equivalent to a 12.8% prevalence.

Table I - Characteristics of the participants

Variable	n = 141 (%)
Gender	
Male	71 (50%)
Female	70 (50%)
Age	24.2 (± 6.1)
Course	
Physical education	73 (52%)
Physiotherapy	68 (48%)
MTSS diagnosis	18 (13%)

Medial Tibial Stress Syndrome

Table II demonstrates the extrinsic/intrinsic factors comparison according to the student's course. The difference between the students number by gender between courses reflects this behavior in reality, in which the number of women who attend Physiotherapy is higher than that of men, and the opposite is seen in the Physical education course. When analyzing the weekly exercise volume, Physiotherapy students practiced half the volume of PE students per week on average (3.4 ± 3.5 vs. 6.8 ± 6.1 h/week, $p < 0.01$). The weekly volume was calculated using information acquired during the application of the evaluation form, and the result comes from the multiplication of the weekly frequency x duration time. The two most cited activities in the two courses were bodybuilding and running, with bodybuilding cited 25 (48%) times by Physiotherapy students and 30 (29%) times by PE students, and running 6 (11%) times by Physiotherapy students and 16 (15%) times by PE students. The activities practiced were counted cumulatively, and the same student could practice more than one type of physical exercise, so the sum of the number of activities is greater than the total number of students. The percentage of practice of activities was calculated by the total number of activities mentioned.

Table II – Comparison of extrinsic/intrinsic factors according to course

Variable	Physiotherapy (n = 68)	Physical education (n = 73)	p
Age	22.61 ±2.19	25.79 ± 8.05	0.001*
Gender			
Male	15 (22%)	56 (77%)	0.001*
Female	53 (78%)	17 (23%)	
Exercise volume (hrs/wk)	3.39 ± 3.48	6.76 ± 6.15	0.001*
Type of exercise			
Bodybuilding	25 (48%)	Bodybuilding	30 (29%)
Running	6 (11%)	Running	16 (15%)
Crossfit	6 (11%)	Soccer	13 (13%)
Other**	16 (30%)	Other**	44 (43%)

Other** (Pilates, jumping, basketball, functional training, footvolley, dance, cycling, wrestling, rowing, archery, swimming, surfing, triathlon, bodyboarding, gymnastics, handball, volleyball, and yoga); Hrs/wk – hours per week. The variables Age and volume of exercise were analyzed by Student's t-test. The gender and type of exercise variables were evaluated using Fisher's exact test

Table III shows the extrinsic/intrinsic factors according to the MTSS diagnosis. There was no significant difference for any of the factors analyzed between people with or without MTSS. The total volume was calculated with information on a weekly frequency, duration, and practice time over time.

Tabela III - Comparação das características de acordo com o diagnóstico

Variable	MTSS (n = 18)	No MTSS (n = 123)	p
Age	22.61 ± 3.43	24.5 ± 6.26	0.21
Gender			
Male	10 (14%)	61 (86%)	0.80
Female	8 (11%)	62 (89%)	
Course			
Physiotherapy	9 (12%)	59 (48%)	0.99
Physical education	9 (13%)	64 (52%)	
Exercise volume (hrs/wk)	5.36 ± 3.35	4.98 ± 5.65	0.78
Total volume (hrs)	960 ± 1016	984 ± 1567	0.94
Type of exercise			
Bodybuilding	12(46%)	44 (34%)	0.62
Running	4 (15%)	18 (14%)	
Other*	10 (39%)	58 (52%)	

Other*: MTSS (pilates, basketball, functional training, crossfit, dance, soccer, gymnastics, and fight); no MTSS – basketball, cycling, crossfit, wrestling, rowing, dancing, archery, swimming, surfing, triathlon, bodyboarding, handball, volleyball, and yoga); hrs/wk – hours per week. The variables age, exercise volume, and total volume were analyzed by Student's t-test. The variables gender, course, and type of exercise were evaluated using Fisher's exact test

Regarding the participants diagnosed by physical examination, the activities most reported as causing MTSS symptoms by the participants were bodybuilding (n = 7; 50%), running (n = 4; 28%), gymnastics (n = 1; 7%), Crossfit (n = 1; 7%), and basketball (n = 1; 7%). Of these participants, 4 (28%) felt MTSS symptoms unilaterally while exercising, while another 10 (71%) felt them bilaterally. When asked about the intensity of pain during exercise, 3 (21%) reported it as being very weak, 6 (43%) as moderate, 4 (29%) as strong, and 1 (7%) as very strong. Regarding the interference of pain in carrying out physical activities, 2 participants (14%) reported that the MTSS interferes a little, 4 (29%) a lot, 5 (36%) reasonably, and 3 (21%) said that MTSS is disabling for physical activities.

Discussion

Our study included 141 students from the Physical Therapy and Physical Education courses at UFES. No difference was observed in the prevalence of MTSS between courses. In addition, we also did not observe any difference in the prevalence of MTSS according to gender, type, or volume of physical activity practiced.

The incidence and prevalence of MTSS vary among different populations. In our study, a total prevalence of 12.8% was found among all students included, 50% of each course. There was no difference in the prevalence of MTSS between physical education (13%) and physiotherapy (12%) courses.

Female gender is considered an intrinsic factor for MTSS. Some studies have already found higher incidences in females, one of which was carried out with recruits in Australia, in which women had an incidence of 52.9%, compared to 28.2% among men (RR: 2.03) [9]. In the present study, women had a prevalence of 11% against 14% in men, which is contrary to what is available in the literature [1,4,11].

Data, such as volume and type of activity, were also analyzed to look for a possible cause of this disagreement, but no relevant correlation was found. Because of this, we assume that the possible explanation for this event has not been investigated by our study. Despite Physical Education students having incidences of up to 15% in other studies and being physically more active than physiotherapy students, the incidence between the two courses did not show significant differences, even with Physical Education students reporting practicing approximately twice the volume of activities weekly (6.77 x 3.39, h/week, $p < 0.01$).

In addition, despite the incidence reaching up to 20% in runners, in our study, the activity cited as the main cause of pain was bodybuilding. However, we observed that this may have happened because the students used this term (bodybuilding) in general, not differentiating between strength and aerobic exercises, such as running on a treadmill, which we suppose to be the activity that causes pain in these individuals [6,9]. The volume of weekly hours of physical activity was not different between the groups with and without MTSS. This data was also not different in a study carried out with naval recruits [1].

Our results may have possible errors due to the greater flexibility of the sample, with students from different periods included, which may influence the time spent performing physical activities. Because the data were collected through interviews, it can be considered a bias since many answers depend on the participants' memory.

Conclusion

We conclude that possibly extrinsic factors such as volume and type of physical activity are not linked to the emergence of SETM in the studied population, because when comparing students with and without SETM there was no statistical difference. However, there is still a small number of studies that address this topic, more studies are needed to realize the role of these factors in SETM. Our study demonstrated that students of Physical education and Physiotherapy courses are a good population to look for when one wants to carry out studies with people with SETM, due to its significant prevalence and the level of Physical activity of this population, it also shows that bodybuilders can be a potential population for conducting intervention studies.

Academic affiliation
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Conflict of interests
We report that there was no financial, personal or political conflict of interest for any of the authors and the institution that contributed financial support.
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Authors' contributions
Conception and design of the research: Cunha TS, Abreu PU and Barauna VG; **Obtaining data:** Cunha TS and Abreu PU; **Data analysis and interpretation:** Cunha TS, Abreu PU, Santos L; **Statistical analysis:** Barauna VG;**Obtaining funding:** Abreu PU, Santos L. **Writing of the manuscript:** Cunha TS, Abreu PU; **Critical review of the manuscript for important intellectual content:** Santos L, Barauna VG.

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