



ANÁLISE EPIDEMIOLÓGICA DE LESÕES EM UMA EQUIPE DE ATLETISMO UNIVERSITÁRIO: UM ESTUDO DE COORTE RETROSPECTIVO

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RESUMO

Este estudo teve como objetivo analisar os perfis físicos e lesões relacionadas ao esporte em uma equipe de atletismo. Um total de 31 participantes, de ambos os gêneros, da equipe de atletismo da faculdade de medicina foram incluídos. Dados sobre suas características físicas foram coletados, e os participantes responderam a um questionário adaptado do “NCAA Injury Surveillance System”. Entre eles, 65% relataram pelo menos uma lesão, com 73,9% das lesões categorizadas como graves. A taxa de lesões foi de 0,27 lesões por 1000 horas de exposição. Atletas lesionados demonstraram um tempo de prática duas vezes maior do que seus colegas não lesionados. Lesões no quadríceps e na canela representaram 52,17% das lesões relatadas. Este estudo sugere que o atletismo universitário apresenta um risco substancial de lesões esportivas graves, particularmente na parte inferior do corpo. Um fator chave que contribui para isso parece ser a duração do tempo de prática.

Palavras-chave: esporte, lesão, ortopedia, quadríceps, canela.

EPIDEMIOLOGICAL ANALYSIS OF INJURIES IN A COLLEGE ATHLETICS TEAM: A RETROSPECTIVE COHORT STUDY

ABSTRACT

This study aims to analyze the physical profiles and sports-related injuries in a track and field team. A total of 31 participants, from both genders, from the medical college's track and field team were included. Data on their physical characteristics were collected, and participants responded to a survey adapted from the “NCAA Injury Surveillance System.” Among them, 65% reported at least one injury, with 73.9% of the injuries categorized as severe. The injury rate was 0.27 injuries per 1000 hours of exposure. Injured athletes demonstrated a practice time twice that of their uninjured counterparts. Injuries to the quadriceps and shin accounted for 52.17% of the reported injuries. This study suggests that collegiate athletics poses a substantial risk of severe sports injuries, particularly in the lower body. A key contributing factor appears to be the duration of practice time.

Keywords: sport, lesion, orthopedics, quadriceps, shin.

INTRODUCTION

Engaging in physical activities is widely acknowledged for its myriad health benefits, encompassing improvements in fitness, disease prevention, reduced susceptibility to drug abuse, and fostering personal and social development¹. Nonetheless, the pursuit of high-performance sports, especially among individuals aiming for excellence, can entail adverse effects such as eating disorders¹ and sports injuries².

The incidence of injuries among athletes surpasses that of the general population and varies depending on factors such as the sports discipline, training volume, specialization, and other contributing elements²⁻⁴. The duration of an athlete's absence from their sport due to injury varies based on factors; such as, injury location, severity, and treatment modality, spanning from a few days⁵ to several months in cases requiring surgical intervention⁶.

Collegiate athletics in Brazil may not be expressive as in other nations, such as the United States, where athletic pursuits are intertwined with professional careers and scholarships⁷. Nonetheless, Brazilian universities hosts sports events organized by the Brazilian Confederation of College Sports (CBDU), where students compete as amateur athletes across various athletic disciplines, including athletics⁸. Although important for the health of students, scientific production related to athletics in Brazil is limited^{6,7}.

The athletics team at the University of the West of São Paulo (UNOESTE), Brazil, affiliated with the medical college, represents one of the teams that competes in such events and lacks comprehensive documentation of its participants. Consequently, this study undertakes an epidemiological survey to elucidate the physical characteristics and injuries sustained by these athletes. Additionally, the study seeks to identify risk factors associated with these injuries.

METHODS

ETHICAL CONSIDERATIONS

This study adhered to all ethical standards of experimentation and received approval from the Research Ethics Committee under registration number 40619620.1.0000.5515, and registered with the Research, Development, and Innovation Coordination of the University of the West of São Paulo under the reference number 6991.

EXPERIMENTAL DESIGN

A retrospective analysis of the UNOESTE athletics team was conducted. Subjects were individually allocated in a room with a researcher, where personal and anthropometric data were collected, followed by a survey administered. To mitigate potential biases in survey completion, participants received prior instructions, and a researcher was available to address any queries during the survey.

RECRUITMENT AND DATA COLLECTION

All individuals enrolled in the athletics team from January to October 2021, encompassing both genders, were invited to participate. Participants' height and weight were measured using a digital scale and a measuring tape. A survey, based on the Injury Surveillance System (ISS)⁵ was employed.

ATHLETE EXPOSURES

To calculate the injury rate per 1,000 hours of exposure (AE), the weekly training time and total sports practice time, including competitive events, were determined. The total number of injuries was divided by the overall exposure time, multiplied by 1,000, yielding the AE.

DATA ANALYSIS

The Shapiro-Wilk test was employed to assess data normality. Age, height, weight, body mass index (BMI), weekly training, and total practice time were compared based on gender and injury presence, utilizing either the independent sample Student t-test or Mann-Whitney U test, depending on normality. The Risk Ratio (RR) with a 95% confidence interval (95% CI) and Fisher's exact test were applied to evaluate the relationship between gender and injury occurrence. A significance level of 5% was assumed.

RESULTS

A total of 32 participants were invited, with 31 respondents; no justification was provided for the refusal of one participant to partake in the study.

SUBJECT CHARACTERIZATION

Population characteristics are detailed in Table 1. Due to issues related to standardizing conditions, data on body fat percentage were excluded. No other data were lost.

Table 1. Population Characterization

	Male	Female
N	12	19
Age (years)	22,92±2,35	22,74±3,28
Height (m)	1,79±0,06*	1,65±0,07*
Weight (Kg)	81,08±13,30*	62,3±11,1*
BMI (Kg/m ²)	25,37±4,53	22,73±3,33
T (h)	7,83±3,3	7,34±3,6

Data expressed in mean±standard deviation.

N=number of participants; T=weekly training time; *p<0.05 independent sample student t-test

The number of athletic modalities practiced per athlete ranged from 1 to 6, as presented in Table 2.

Table 2. Number of Participants per Modality

Modality	Participants (Male/Female)
100-meters dash	7/12
400-meters dash	4/5
1500-meters	2/4
5000-meters	2/0
4x100-meters relay	5/4
4x400-meters relay	4/0
Shot Put	2/5
Disc Throw	1/2
Javelin Throw	3/0
Long Jump	1/2
High Jump	2/1
Triple Jump	2/0

Only 6 participants had a competition history, with 3 having competed once, 2 twice, and 1 five times, all at the regional or state level.

INJURY ASSESSMENT

A total of 23 injuries were identified, with 17 athletes sustaining 1 injury and 3 athletes presenting 2 injuries. Women accounted for 52.6% of injuries. Half of the female participants had at least 1 injury, while male participants experienced an 83.3% injury rate. A trend association between gender and injury occurrence was observed (Risk Ratio, 1.58; 95% Confidence Interval, 0.96-2.59; p=0.06). The overall exposure time amounted to 82,627.62 hours, resulting in AE of 0.28, with no discernible gender-based differences. The injury recurrence was similar between genders, being 1.1 in female and 1.3 in male athletes.

The number of recorded injuries by site are presented in Table 3.

Table 3. Incidence of injuries by site

Injury Site	Number of injuries (M/F)
Shin	3/4
Quadriceps	2/3
Hamstrings	3/0
Knee	2/1
Patella	0/2
Ankle	1/1
Shoulder Blade	1/0

All recorded injuries occurred during training: 2 during warm-up, 9 during the first half, 7 during the second half, and 5 during the cool-down. Of these, 20 were new injuries, 2 were recurrent injuries from the same modality, and 1 resulted from a complication of a previous injury from another modality. 2 injuries necessitated permanent removal from participation, 3 injuries didn't result in time away, and the average time away for the remaining injuries was 53 days, ranging from 7 days to 6 months. Among those with a competition history, 4 had injuries. The 2 uninjured individuals had competed only once.

Incomplete muscle tear and inflammation accounted for 7 injuries, while 3 injuries were due to cartilage damage, incomplete ligament tear, peripheral nervous injury, and stress fracture each. The source of three injuries remained unknown. Only 13 injuries were clinically diagnosed, with imaging exams conducted in 8 cases. 2 injuries were treated with non-steroidal anti-inflammatory medication for 5 and 7 days, and 2 were managed with prescribed dietary supplementation for 3 and 5 months. No surgical interventions were performed. Physical therapy was administered for 11 injuries, with 9 having a mean treatment duration of 1.25 ± 0.47 months, and two with notably extended durations of 6 and 16 months.

RISK FACTOR

The characterization of injured and uninjured individuals is presented in Table 4.

Table 4. Characteristics of injured and uninjured participants

	Injured (20)	Uninjured (11)
Age (years)	22,45 \pm 2,19	23,45 \pm 3,3,96
Height (m)	1,72 \pm 0,1	1,68 \pm 0,08
Weight (Kg)	67,58 \pm 11,31	73,18 \pm 20,27
BMI (Kg/m ²)	22,65 \pm 2,76	25,74 \pm 5,15
Weekly Training (h)	7,32 \pm 3,34	7,91 \pm 3,75
Total Practice Time (months)	15,6 \pm 10,59*	8 \pm 5,19*

Data expressed in mean \pm standard deviation.

*p=0.0438 unpaired Mann-Whitney U test.

DISCUSSION

This study revealed a noteworthy prevalence of injuries among college athletes, with an unexpectedly high incidence of injuries classified as severe, defined by more than 21 days of time away⁹, highlighting the importance of monitoring and mitigating injuries for the well-being of athletes.

A study by Lambert et al.¹⁰, encompassing 743 professional athletics athletes who self-reported injuries during the 2012-2016 Olympic cycle, found an injury prevalence of 64%, similar to this study. The incidence of injuries in this study is also similar to the results found by the Francis et al.¹¹ systematic review, which summarizing data from 36 studies encompassing 18,195 runners. The high injury rates reported in this study can be attributed to the high specialization presented by the participants. Although several

athletes practiced more than one modality, these tended to be all racing disciplines, contributing not only to specialization, but also to the occurrence of injuries due to overuse³.

The distribution of injuries per body segment aligns not only with the specialization hypothesis, but also with previous studies, emphasizing the lower limbs as the primary site of injuries, particularly in the thighs, knees, and ankles^{10,11}. The demand and susceptibility to injuries in these regions highlight the importance of targeted preventive measures for lower body segments in these athletes.

The incidence of severe injuries was substantially higher than that reported by Kay et al.⁹ in the NCAA Injury Surveillance Program (NCAA ISP), reporting a total of 220 severe injuries out of 1881 cases (11.7%) during the academic period of 2009-10 to 2014-15. The discrepancy may arise from differences in the types of injuries reported, such as ruptures, fractures, and cartilage damage, which tend to require complete recovery from athletes to resume activities. Prolonged time away can adversely affect athletes, limiting not only their participation in sports activities but also their engagement in social and academic events, thereby compromising overall physical and mental well-being; therefore, monitoring and mitigating these is especially important.

Despite the higher-than-expected overall injury incidence, the AE was relatively low. A Swedish study by Zachrisson et al.¹² reported a substantially higher injury rate of 1.81 AE during one season, suggesting that factors such as the amateur level, infrequent competitions, and lower training intensity may contribute to the lower AE in this study. Similarly, Boltz et al.¹³ reported a higher rate of 2.37 AE in a study derived from the NCAA ISP, which included 1081 male athletes with 455,609 exposure hours from 2014-15 to 2018-19. The lower AE in this study may be attributed to the limited number of competitions, reflecting lower training intensity and event exposure under stress conditions.

Injury recurrence in this study was comparatively low contrasting with findings from Lemoyne et al.¹⁴, who reported an incidence of over 2 injuries by athletes in a cross-sectional analysis of college-level. This low recurrence rate found in this study may be linked to the extended time away from sports following an injury documented by participants. This long period away, although it may affect the social life of the participants, would allow a complete recovery from injuries even without adequate health care, thus preventing the recurrence or complication of injuries.

The sole significant risk factor identified in this study was the total practice time, nearly double in injured athletes than in non-injured athletes. This finding aligns with existing literature, underscoring that longer practice time corresponds to increased exposure hours and a higher cumulative training load, recognized risk factors for injury development^{2,15}. This emphasizes the importance of monitoring practice time and managing training loads to mitigate injury risks; as well as, demonstrating the need for the formulation of more targeted and efficient training plans in order to mitigate the risks of injury in athletes.

The retrospective nature of this study introduces potential limitations, including the likelihood of under-reporting minor injuries and inaccuracies in reported data. Participants may have forgotten or underestimated certain injuries, compromising the accuracy of the data. Additionally, the small sample size might have influenced the identification of risk factors. Prospective studies are imperative to validate these findings and implement targeted preventive measures.

CONCLUSION

The analysis of the college athletics team revealed a distinctive profile characterized by a low injury rate per exposure time but a high prevalence of severe injuries, particularly in the lower limbs. The primary identified risk factor was the duration of training practice. While some aspects of our findings align with those of larger studies, such as injury incidence and affected anatomical sites, the distinct injury rate challenges conventional wisdom derived from existing literature. These similarities and disparities may underscore the influence of diverse social conditions, training dynamics, and competitive contexts in small athletics centers compared to larger ones. Consequently, our study prompts a reevaluation of the applicability of previous data for interpreting and formulating prevention strategies in smaller university sports centers. These findings contribute uniquely by shedding light on previously overlooked groups within college sports, emphasizing the need for tailored approaches to injury prevention in diverse athletic settings.

CONFLICT OF INTEREST

The authors declare that there is no potential conflict of interest that could interfere with the impartiality of this scientific work.

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