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EPIDEMIOLOGICAL PROFILE OF MUSCULOSKELETAL INJURIES AMONG YOUTH ATHLETES DURING THE 2024 BRAZILIAN SCHOOL GAMES

PERFIL EPIDEMIOLÓGICO DE LESÕES MUSCULOESQUELÉTICAS EM JOVENS ATLETAS DURANTE OS JOGOS ESCOLARES BRASILEIROS DE 2024

PERFIL EPIDEMIOLÓGICO DE LAS LESIONES MUSCULOESQUELÉTICAS EN JÓVENES ATLETAS DURANTE LOS JUEGOS ESCOLARES BRASILEÑOS DE 2024

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ABSTRACT

Introduction: Sports injuries are common among young athletes and may compromise health, performance, and continued participation in sports. However, epidemiological data describing injury patterns during major Brazilian school sports competitions remain limited. Objective: To analyze the epidemiological profile of sports injuries among athletes participating in the 2024 Brazilian School Games (JEBs). Methods: This cross-sectional observational study was conducted during the 2024 Brazilian School Games in Recife, Brazil. Injuries requiring physiotherapy assessment or treatment during training or competition were recorded using a standardized injury surveillance system. Variables included sex, sport, injury type, anatomical location, clinical outcome, hospital referral, and withdrawal from competition. Data were analyzed using descriptive statistics and are presented as absolute and relative frequencies. Results: The championship included approximately 6,000 officially registered athletes, equally distributed between males and females across the different sports. A total of 974 injuries were recorded, corresponding to a rate of approximately 16.2 injuries per 100 registered athletes. Muscle injuries were the most common (55.7%), followed by joint (23.7%), bone (8.7%), ligament (6.9%), and tendon injuries (5.0%). Female athletes accounted for the majority of physiotherapy consultations (n = 525), with no relevant differences in the distribution of injury types between sexes. Most athletes returned to competition after treatment (n = 701), whereas 48 were withdrawn from competition, including 11 who required hospital referral. Muscle injuries predominated in swimming (90.8%), athletics (72.0%), and badminton (69.6%). Futsal accounted for the highest number of injuries (n = 206), followed by athletics (n = 143) and basketball (n = 107).

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Sport-specific injury patterns were identified, including thigh injuries in athletics, ankle injuries in basketball, knee injuries in handball, karate, and wrestling, and shoulder/neck injuries in swimming and wrestling. Conclusions: Muscle injuries were the most common injury type during the 2024 Brazilian School Games and were generally associated with return to competition. In contrast, joint and ligament injuries were more severe and were more frequently associated with withdrawal from competition. Injury patterns varied across sports, reflecting their specific biomechanical demands and highlighting the importance of targeted injury prevention strategies for young athletes.

KEYWORDS: Sports injuries; School sports; Injury surveillance.

RESUMO
Introdução: Lesões esportivas são comuns entre jovens atletas e podem comprometer a saúde, o desempenho e a continuidade da prática esportiva. Entretanto, ainda são escassos os dados epidemiológicos sobre o perfil de lesões em grandes competições escolares brasileiras. Objetivo: Analisar o perfil epidemiológico das lesões esportivas em atletas participantes dos Jogos Escolares Brasileiros de 2024 (JEBs). Métodos: Estudo observacional transversal realizado durante os JEBs de 2024, em Recife, Brasil. Foram registradas as lesões que necessitaram de avaliação ou tratamento fisioterapêutico durante treinamentos ou competições, utilizando um sistema padronizado de vigilância. As variáveis analisadas incluíram sexo, modalidade esportiva, tipo de lesão, localização anatômica, desfecho clínico, encaminhamento hospitalar e afastamento da competição. Os dados foram analisados por estatística descritiva, sendo apresentados em frequências absolutas e relativas. Resultados: O campeonato contou com aproximadamente 6.000 atletas inscritos, distribuídos igualmente entre os sexos nas diferentes modalidades esportivas. Foram registradas 974 lesões, correspondendo a uma incidência de aproximadamente 16,2 lesões por 100 atletas. As lesões musculares foram as mais frequentes (55,7%), seguidas das articulares (23,7%), ósseas (8,7%), ligamentares (6,9%) e tendíneas (5,0%). As atletas do sexo feminino representaram a maioria dos atendimentos (n=525), sem diferenças relevantes na distribuição dos tipos de lesão entre os sexos. A maior parte dos atletas retornou à competição após o atendimento (n=701), enquanto 48 foram afastados, incluindo 11 encaminhamentos hospitalares. As lesões musculares predominaram na natação (90,8%), atletismo (72,0%) e badminton (69,6%). O futsal apresentou o maior número de lesões (n=206), seguido do atletismo (n=143) e do basquetebol (n=107). Foram observados padrões específicos por modalidade, destacando-se lesões na coxa no atletismo, tornozelo no basquetebol, joelho no handebol, karatê e luta livre, e ombro/pescoço na natação e luta livre. Conclusão: As lesões musculares foram o tipo mais frequente durante os Jogos Escolares Brasileiros de 2024 e, em geral, estiveram associadas ao retorno à competição. Em contrapartida, as lesões articulares e ligamentares apresentaram maior gravidade e foram mais frequentemente relacionadas ao afastamento esportivo. Os padrões de lesão variaram entre as modalidades, refletindo suas demandas biomecânicas específicas e reforçando a importância de estratégias preventivas direcionadas para jovens atletas.

PALAVRAS-CHAVE: Lesões esportivas; Esportes escolares; Vigilância de lesões.

RESUMEN
Introducción: Las lesiones deportivas son frecuentes entre los atletas jóvenes y pueden comprometer la salud, el rendimiento y la continuidad de la práctica deportiva. Sin embargo, los datos epidemiológicos sobre el perfil de las lesiones en grandes competiciones escolares brasileñas siguen siendo limitados. Objetivo: Analizar el perfil epidemiológico de las lesiones deportivas en atletas participantes de los Juegos Escolares Brasileños de 2024 (JEBs). Métodos: Estudio observacional de corte transversal realizado durante los Juegos Escolares Brasileños de 2024, en Recife, Brasil. Se registraron las lesiones que requirieron evaluación o tratamiento fisioterapéutico durante los entrenamientos o las competiciones, utilizando un sistema estandarizado de vigilancia de lesiones. Las variables analizadas incluyeron sexo, modalidad deportiva, tipo de lesión, localización anatómica, desenlace clínico, derivación hospitalaria y retirada de la competición. Los datos se analizaron mediante estadística descriptiva y se presentaron en frecuencias absolutas y relativas. Resultados: El campeonato contó con aproximadamente 6.000 atletas inscritos oficialmente, distribuidos equitativamente entre ambos

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sexos en las diferentes modalidades deportivas. Se registraron un total de 974 lesiones, lo que corresponde a una tasa aproximada de 16,2 lesiones por cada 100 atletas inscritos. Las lesiones musculares fueron las más frecuentes (55,7%), seguidas de las articulares (23,7%), óseas (8,7%), ligamentosas (6,9%) y tendinosas (5,0%). Las atletas femeninas representaron la mayoría de las atenciones fisioterapéuticas (n = 525), sin diferencias relevantes en la distribución de los tipos de lesión entre ambos sexos. La mayoría de los atletas regresó a la competición tras la atención recibida (n = 701), mientras que 48 fueron retirados de la competición, incluidos 11 que requirieron derivación hospitalaria. Las lesiones musculares predominaron en natación (90,8%), atletismo (72,0%) y bádminton (69,6%). El fútbol sala presentó el mayor número de lesiones (n = 206), seguido del atletismo (n = 143) y el baloncesto (n = 107). Se observaron patrones específicos según la modalidad deportiva, destacándose las lesiones de muslo en atletismo, de tobillo en baloncesto, de rodilla en balonmano, kárate y lucha libre, y de hombro/cuello en natación y lucha libre. Conclusiones: Las lesiones musculares fueron el tipo de lesión más frecuente durante los Juegos Escolares Brasileños de 2024 y, en general, se asociaron con el retorno a la competición. En contraste, las lesiones articulares y ligamentosas presentaron mayor gravedad y se relacionaron con mayor frecuencia con la retirada de la competición. Los patrones de lesión variaron entre las modalidades deportivas, reflejando sus demandas biomecánicas específicas y reforzando la importancia de desarrollar estrategias de prevención dirigidas a los atletas jóvenes.

PALABRAS CLAVE: *Lesiones deportivas; Deporte escolar; Vigilancia de lesiones.*

INTRODUCTION

Participation in competitive youth sports has increased substantially in recent decades, driven by school-based programs, family support, and institutional initiatives. Although early engagement in sports is associated with important physical, psychological, and social benefits, including improved well-being and reduced exposure to vulnerable environments, participation in organized sports also increases the risk of musculoskeletal injuries, particularly among athletes exposed to specialized training and high competitive demands (COSTA E SILVA; TELES; FRAGOSO, 2022). Previous studies have demonstrated that young athletes exposed to high training volumes are at greater risk of injury, which may negatively affect their health, athletic performance, and long-term participation in sports (JAYANTHI *et al.*, 2015; WHITTAKER *et al.*, 2019).

Epidemiological surveillance of sports injuries has become a priority for international organizations, including the International Olympic Committee, which has established standardized recommendations for injury and illness monitoring across different sports and competitive settings (BAHR *et al.*, 2020). Studies conducted during large multisport events involving adolescent athletes, such as the Youth Olympic Games and international youth championships, have consistently reported muscle injuries, sprains, and contusions as the most common conditions, highlighting the importance of systematic injury surveillance to identify epidemiological patterns and inform preventive strategies (NABHAN *et al.*, 2016; POST *et al.*, 2023). Beyond their immediate health consequences, sports injuries may negatively influence continued participation and increase the risk of sport dropout among young athletes (CAMPBELL *et al.*, 2019; PLUIM *et al.*, 2015).

Despite the growing number of epidemiological investigations conducted in international

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competitions, studies describing injury patterns in large Brazilian school sport events remain limited. Descriptive epidemiological studies are essential to characterize injury distribution, identify the sports and anatomical regions most frequently affected, and support the development of evidence-based prevention programs targeting young athletes (SOLIGARD *et al.*, 2017; LAMBERT *et al.*, 2022). Therefore, this study aimed to analyze the epidemiological profile of sports injuries recorded among athletes aged 12 to 14 years participating in the 2024 Brazilian School Games (JEBs).

MATERIALS AND METHODS

Study design

This is a descriptive, cross-sectional, observational epidemiological study conducted during the Brazilian School Games (JEBs), held in Recife, Pernambuco, Brazil, between September 20 and October 3, 2024. The competition involved school-aged athletes from all Brazilian states and the Federal District. The study was conducted in accordance with the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline and its extension for sports injury and illness surveillance (STROBE-SIIS).

Ethical aspects

The study was approved by the Research Ethics Committee of the Federal University of Sergipe (CEP/UFS) under opinion number 6,642,259 (CAAE number 75797323.1.0000.5546). All procedures were conducted in compliance with the ethical principles established by Resolution No. 466/2012 of the Brazilian National Health Council. Participant confidentiality and anonymity were ensured throughout all stages of the research, with athletes identified exclusively by numerical codes. Written informed consent was obtained from the parents or legal guardians of all participants prior to data collection.

Participants

The study population consisted of 6,000 registered athletes aged 12 to 14 years participating in the 2024 Brazilian School Games. All athletes requiring assessment and/or treatment by the medical team during the official competition period were included in the study.

Injury surveillance system and procedures

Data collection was carried out by a team of 20 physiotherapists who received standardized training regarding the study, clinical assessment procedures, and the completion of the electronic surveillance form used throughout the competition. To improve data quality and minimize recording errors, all records were reviewed daily by two supervisors.

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The surveillance system operated in two healthcare settings: emergency care, provided at the competition venue or at the site where the injury occurred during training and matches; and outpatient care, provided at temporary health facilities located at the competition venues. Data collection began on the first day of competition and concluded one day after the event ended.

Each athlete was assigned an individual identification code to prevent duplicate records. Follow-up consultations related to the same injury episode were not counted as new cases. Athletes could contribute more than one record only when distinct injury events occurred during the competition period.

An injury was defined as any acute musculoskeletal complaint sustained during training or competition that required assessment or treatment by the physiotherapy team during the event. Pre-existing conditions and complaints unrelated to sports participation during the competition were excluded.

Collected variables included sex, sport, anatomical location of the injury, injury type, need for hospital referral, additional diagnostic tests, withdrawal from competition, and clinical outcome following assessment.

The sports included athletics, adapted athletics, badminton, basketball, futsal, artistic gymnastics, rhythmic gymnastics, handball, judo, karate, swimming, taekwondo, table tennis, volleyball, beach volleyball, and wrestling. Anatomical locations were classified as follows: head, cervical spine, thoracic spine, lumbosacral spine, upper limbs (shoulder, arm, elbow, forearm, wrist, hand, and fingers), and lower limbs (hip, thigh, knee, lower leg, ankle, and foot). Injuries were categorized according to the primary tissue affected: muscular, articular, osseous, ligamentous, or tendinous.

Clinical outcomes included immediate return to activity, return to competition, outpatient referral, need for additional diagnostic tests, and withdrawal from competition. In accordance with the medical protocols adopted during the 2024 Brazilian School Games, athletes referred for hospital evaluation were automatically withdrawn from competition pending diagnosis clarification. Therefore, hospital referrals were considered a subcategory of withdrawal from competition and reported separately as indicators of injury severity.

STATISTICAL ANALYSIS

The data were organized in Microsoft Excel® spreadsheets and analyzed using R software (version 4.3.2). Statistical analysis was performed using descriptive statistics, with categorical variables presented as absolute (n) and relative (%) frequencies. The results were organized into frequency distribution tables, allowing for the characterization of the epidemiological profile of the injuries observed during the competition, according to the variables analyzed.

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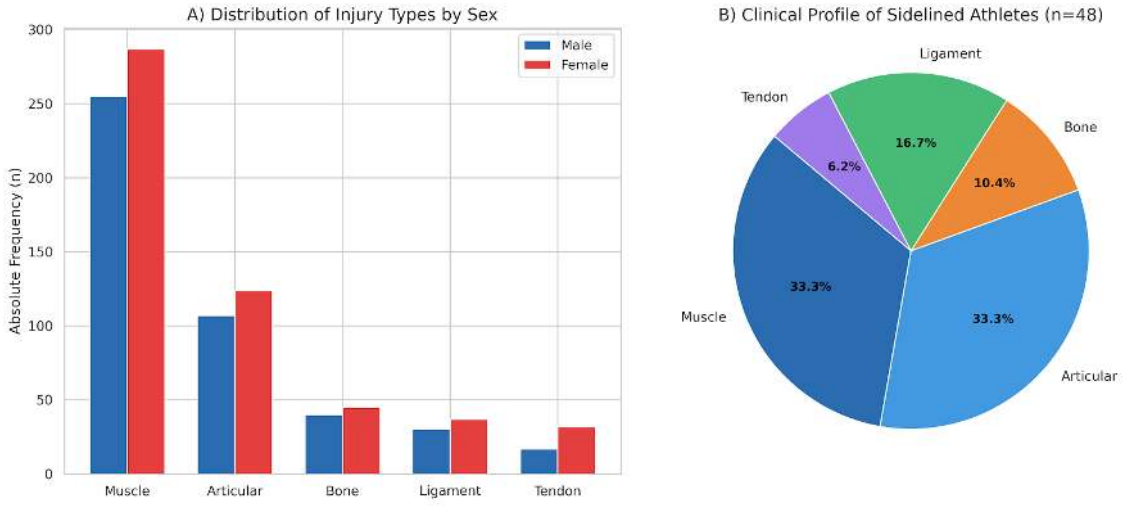
RESULTS

A total of 974 injuries were recorded during the 2024 Brazilian School Games. Muscle injuries were the most frequent category, accounting for 55.65% of all cases, followed by joint (23.72%), bone (8.73%), ligament (6.88%), and tendon injuries (5.03%). Female athletes accounted for a greater absolute number of consultations (n = 525), although the distribution of injury types was similar between sexes.

Clinical outcomes were not mutually exclusive, allowing a single athlete to receive more than one clinical disposition during the competition period. Most athletes returned to competition following the initial evaluation (n = 701), whereas 48 athletes were withdrawn from competition. Of these, 11 required hospital referral for further medical evaluation. Although muscle injuries represented the largest proportion of all recorded injuries, joint and ligament injuries accounted for a substantial proportion of cases resulting in competition withdrawal (FIGURE 1).

Figure 1. Distribution of sports injuries according to sex and clinical outcome. (a) absolute number of injuries among male and female athletes. (b) relative distribution of injury types among athletes withdrawn from competition (n = 48)



Muscle injuries were the most frequent injury type across most sport modalities, particularly in swimming (90.80%), athletics (72.03%), and badminton (69.64%). Futsal accounted for the highest absolute number of injuries among all sports (n = 206), followed by athletics (n = 143) and basketball (n = 107).

Joint injuries were most prevalent in judo (46.88%) and beach volleyball (42.86%). In contrast, taekwondo demonstrated a distinct injury profile, with a high proportion of bone injuries (35.71%), approaching the frequency of muscle injuries (39.29%). Basketball presented a more balanced

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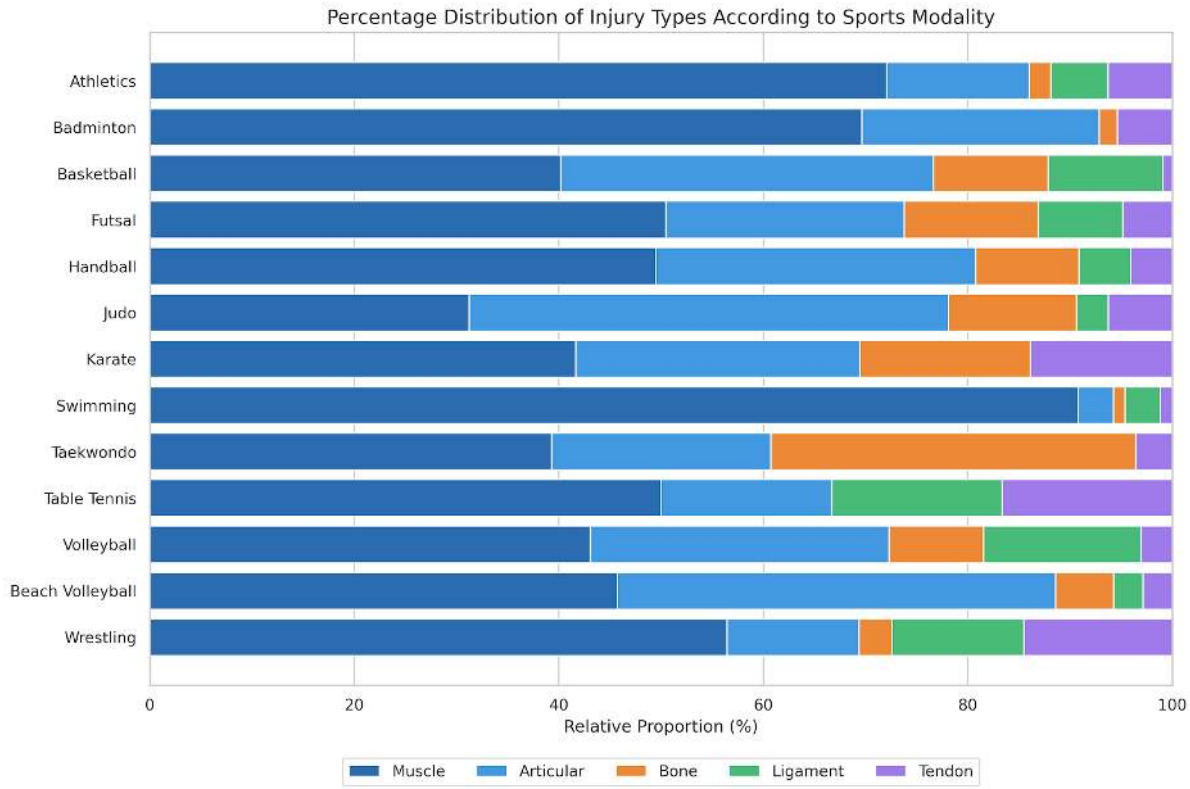
distribution between muscle (40.19%) and joint injuries (36.45%), whereas wrestling showed the highest proportion of tendon injuries (14.52%) among the evaluated modalities (FIGURE 2).

Figure 2. Relative distribution of injury types according to sport modality (100% stacked horizontal bars)



Distinct patterns of upper-limb and cervical injuries were observed across sport modalities. In swimming, the most frequently affected regions were the neck (20.69%) and shoulder (17.24%). A similar pattern was identified in wrestling, which demonstrated a high proportion of shoulder (19.35%) and neck injuries (16.13%).

Among combat sports, different injury distributions were observed. Judo was characterized by a greater proportion of shoulder (18.75%) and elbow injuries (12.50%), whereas taekwondo showed higher frequencies of arm and wrist injuries (14.29% each). In addition, karate (11.11%) and judo (9.38%) presented the highest proportions of head injuries among the evaluated modalities.

Among court and net sports, handball demonstrated a high frequency of shoulder injuries (16.16%), whereas beach volleyball showed the highest proportion of hand injuries (17.14%). The distribution of head, neck, and upper-limb injuries according to sport modality is illustrated in figure 3.

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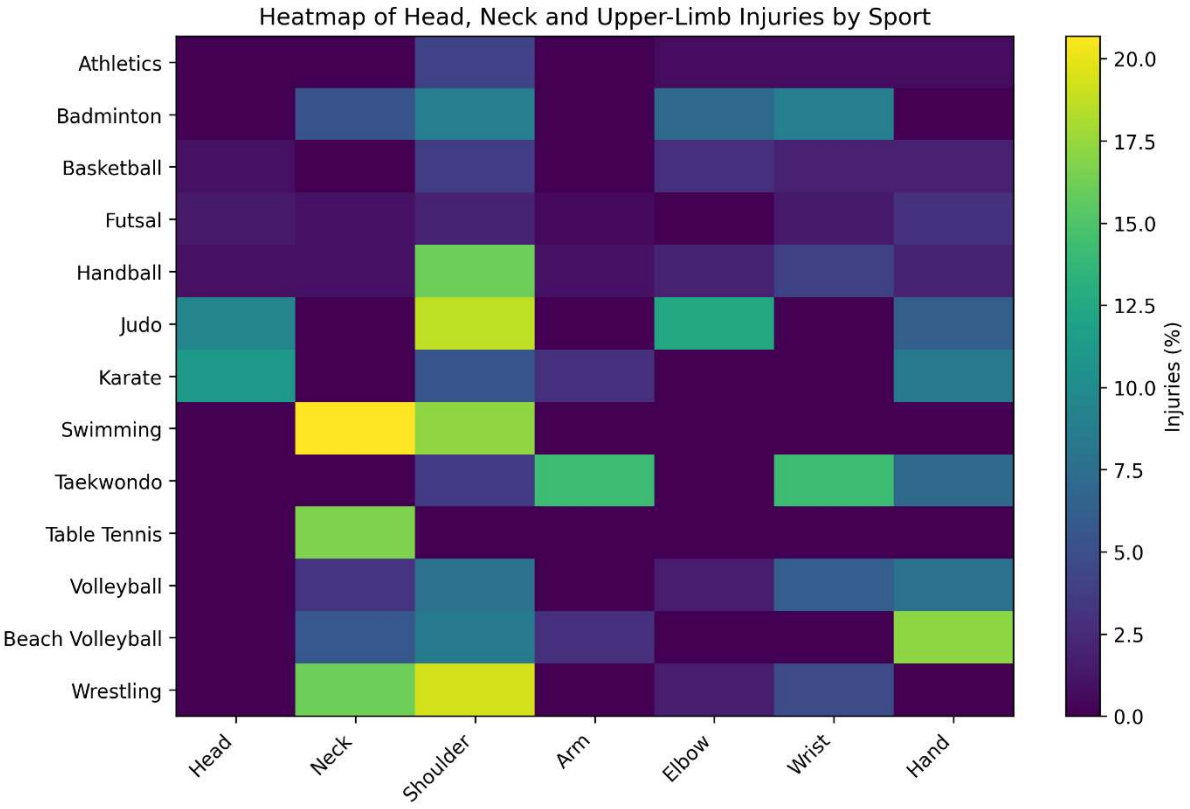
Figure 3. heatmap of head, neck, and upper-limb injury distribution according to sport modality. Darker shades indicate higher percentages of injuries within each anatomical region



Distinct trunk injury patterns were observed across sport modalities. Swimming demonstrated the highest frequency of spinal involvement, with thoracic spine injuries accounting for 14.94% of cases and lumbosacral injuries accounting for 12.64%, in addition to 4.60% of injuries involving the thoracic region. Among team sports, handball presented a relatively high frequency of lumbosacral injuries (7.07%), whereas volleyball showed the highest proportion of thoracic spine injuries (7.69%), followed by beach volleyball (5.71%). In wrestling, lumbosacral injuries represented 6.45% of all recorded cases. Among combat sports, judo demonstrated the highest frequencies of thoracic (9.38%) and thoracic spine injuries (6.25%) compared with the other evaluated modalities. Overall, trunk injuries were less frequent than those affecting the upper and lower limbs, although distinct sport-specific patterns were observed. Lower limbs represented the most frequently affected body region among the evaluated athletes. Injury distribution varied according to sport modality, with predominance of injuries involving the thigh, knee, lower leg, and ankle.

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In athletics, the thigh was the most commonly affected region (30.77%), followed by the lower leg (20.98%) and knee (15.38%). Basketball demonstrated the highest proportion of ankle injuries (37.38%), whereas futsal was characterized by a predominance of knee (22.33%) and ankle injuries (18.45%). Similarly, handball showed a predominance of knee injuries (24.24%). Among combat sports, the knee represented the primary injury location in karate (33.33%) and wrestling (33.87%). In taekwondo, injuries were more frequently observed in the lower leg (21.43%) and ankle (17.86%). The predominant lower-limb injury locations according to sport modality are presented in table 1.

Table 1. Anatomical distribution of lower-limb injuries according to sport modality (%)

SPORT MODALITY	HIP	THIGH	KNEE	LOWER LEG	ANKLE	FOOT
ATHLETICS	1.4%	30.8%	15.4%	21.0%	12.6%	3.5%
BADMINTON	0.0%	19.6%	16.1%	12.5%	3.6%	0.0%
BASKETBALL	2.8%	5.6%	19.6%	12.2%	37.4%	2.8%
FUTSAL	5.8%	15.5%	22.3%	14.1%	18.5%	4.9%
HANDBALL	4.0%	13.1%	24.2%	0.0%	11.1%	3.0%
JUDO	3.1%	3.1%	9.4%	3.1%	6.3%	3.1%
KARATE	11.1%	2.8%	33.3%	11.1%	0.0%	2.8%
SWIMMING	0.0%	11.5%	2.3%	13.8%	1.2%	0.0%
TAEKWONDO	0.0%	0.0%	10.7%	21.4%	17.9%	7.1%
TABLE TENNIS	0.0%	0.0%	50.0%	0.0%	16.7%	16.7%
VOLLEYBALL	0.0%	9.2%	10.8%	3.1%	23.1%	13.9%
BEACH VOLLEYBALL	5.7%	14.3%	11.4%	5.7%	8.6%	8.6%
WRESTLING	0.0%	3.2%	33.9%	8.1%	0.0%	0.0%

LEGEND: INTENSITY (% OF INJURIES PER LINE): HIGH (> 30%), MEDIUM-HIGH (20% - 30%), MODERATE (10% - 19.9%), LOW (1% - 9.9%) | NONE (0%).

DISCUSSION

The present study analyzed the epidemiological profile of musculoskeletal injuries requiring physiotherapy care during the 2024 Brazilian School Games. The main findings were the predominance of muscle injuries, the greater involvement of the lower limbs, and the low proportion of cases resulting in withdrawal from competition. Although muscle injuries accounted for more than half of all recorded cases, most athletes returned to competition after initial physiotherapy assessment and management. In contrast, joint and ligament injuries, despite being less frequent, demonstrated greater clinical impact, being proportionally more associated with competition withdrawal and referral for further medical evaluation. In addition, distinct anatomical injury patterns were observed across sport modalities, including a predominance of thigh injuries in athletics, ankle injuries in basketball, knee injuries in handball, karate, and wrestling, and frequent involvement of the shoulder and neck in swimming and wrestling, highlighting the influence of sport-specific demands on injury occurrence among young

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athletes.

Unlike findings from several studies involving school-aged and adolescent athletes, in which ligament sprains, joint injuries, and fractures are frequently reported among the most prevalent conditions (PRIETO-GONZÁLEZ *et al.*, 2021; RITZER *et al.*, 2021), the present study identified a marked predominance of muscle injuries. This pattern may be related, at least in part, to the composition of the sports included in the competition and to the injury profiles observed in specific modalities. Both athletics and swimming demonstrated high proportions of muscle injuries, contributing substantially to the overall injury profile of the event. In athletics, injuries predominantly affected the thigh and lower leg, a finding consistent with previous reports involving young track-and-field athletes, in whom lower-limb injuries represent a major source of medical attention during training and competition (MARTÍNEZ-SILVÁN *et al.*, 2020; EDOUARD *et al.*, 2024). In swimming, in addition to the high frequency of muscle injuries, substantial involvement of the shoulder, neck, and spine was observed, regions commonly exposed to high training volumes and repetitive movement patterns throughout the season (FEIJEN, S. *et al.*, 2020; STIRLING *et al.*, 2024). Together, these findings suggest that the characteristics of the most represented sports played an important role in shaping the epidemiological profile observed during the competition.

Team sports presented injury patterns largely consistent with those reported in the international literature for young athletes. Futsal accounted for the highest absolute number of injuries, with a predominance of knee and ankle involvement, a finding similar to that reported in school competitions and injury surveillance programs identifying the lower limbs as the most frequently affected body region in this sport (GENÉ-MORALES *et al.*, 2021; ATMAJA *et al.*, 2025). Likewise, basketball demonstrated a high frequency of ankle injuries, corroborating systematic reviews and prospective studies identifying the ankle as the anatomical region most frequently injured in adolescent athletes, particularly due to sprains associated with jumping, landing, and rapid changes of direction (AARTS *et al.*, 2021; LIU *et al.*, 2024). In handball, knee and shoulder injuries predominated, a pattern widely described in young athletes and consistent with the characteristics of the sport reported in the literature (MARTÍN-GUZÓN *et al.*, 2021; MØLLER *et al.*, 2024). Collectively, these findings reinforce that, although team sports share common features such as physical contact and rapid directional changes, each modality presents specific demands that may influence the anatomical distribution of injuries.

Combat sports demonstrated distinct injury patterns, suggesting the influence of the technical and regulatory characteristics of each discipline on the anatomical distribution of injuries. In judo, shoulder and elbow injuries were the most frequent, a finding partially consistent with recent studies reporting substantial involvement of the shoulder and knee among young and elite judokas (IGLESIAS *et al.*, 2023; KIM *et al.*, 2021). Karate was characterized by a higher proportion of head injuries, corroborating systematic reviews and epidemiological investigations identifying the head and neck as the primary sites of injury in this sport (LYSTAD *et al.*, 2020; FATAHI *et al.*, 2022). In contrast, taekwondo

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presented a distinct profile, characterized by a high frequency of bone injuries and upper-limb involvement, differing somewhat from the literature, which generally reports a predominance of lower-limb injuries, particularly affecting the foot, ankle, and knee (JEONG *et al.*, 2021; BLANCO *et al.*, 2025). Finally, wrestling demonstrated a predominance of injuries involving the knee, shoulder, and neck, a pattern similar to that reported in recent studies involving young athletes, in which the head, shoulder, and knee are among the most frequently affected anatomical regions (KHERA *et al.*, 2024; SNYDER *et al.*, 2024). Taken together, these findings reinforce that, even within the broader category of combat sports, individual disciplines present distinct epidemiological profiles, requiring sport-specific prevention strategies.

This study has some limitations that should be considered when interpreting the findings. Because it was a cross-sectional investigation based on clinical records collected during a single competition, it was not possible to monitor the clinical evolution of athletes after the event or determine the duration of time loss associated with each injury. Furthermore, the absence of exposure data prevented the calculation of injury incidence rates and comparisons of relative risk across sport modalities. Nevertheless, the study also presents important strengths, including the evaluation of a large sample of athletes representing all regions of Brazil, the use of a standardized injury surveillance system, and the assessment of multiple sport modalities within one of the largest school sport events in Latin America. Therefore, these findings provide relevant information to support the development of injury prevention strategies, the organization of healthcare services, and the implementation of programs aimed at reducing injury risk among young athletes.

CONCLUSION

The epidemiological profile of injuries recorded during the 2024 Brazilian School Games was characterized by a predominance of muscle injuries and a high frequency of lower-limb involvement across most sports disciplines. Although muscle injuries accounted for the majority of physiotherapy consultations, joint and ligament injuries were more frequently associated with withdrawal from competition and hospital referral, suggesting greater clinical severity. Furthermore, the anatomical distribution of injuries varied by sport, reflecting the specific biomechanical demands of each discipline. These findings provide valuable information to inform the development of sport-specific injury prevention strategies, optimize athlete triage and clinical management, guide training and rehabilitation practices, and improve the organization of health services during major school sporting events. Moreover, they can assist coaches, healthcare professionals, and event organizers in devising evidence-based preventive measures aimed at mitigating injury risks and promoting safer participation in youth sports.

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