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Artigo Original

EPIDEMIOLOGIA DE LESÕES RELACIONADAS À CORRIDA EM CORREDORES RECREACIONAIS DO BRASIL: UM ESTUDO TRANSVERSAL

EPIDEMIOLOGY OF RUNNING-RELATED INJURIES IN RECREATIONAL RUNNERS FROM BRAZIL: A CROSS-SECTIONAL STUDY

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RESUMO

Existe um paradoxo entre os benefícios da corrida e sua alta incidência de lesões. O objetivo deste estudo foi descrever a prevalência e as características das lesões musculoesqueléticas entre corredores brasileiros. Métodos: Um estudo transversal foi realizado em Goiânia, Goiás, Brasil, envolvendo 100 corredores recreativos. A pesquisa avaliou a prevalência de lesões relacionadas à corrida (RRIs), sua frequência, localizações, durações e a busca por tratamento especializado. Resultados: Um total de 52% dos participantes relatou pelo menos uma RRI. As áreas afetadas foram a parte inferior da perna (46,8%), joelho (34%) e tornozelo/pé (19,2%). As lesões incluíram síndrome do estresse tibial medial (MTSS) (36,2%), fascite plantar (19,1%) e dor patelofemoral (PFP) (17%). As RRIs ocorreram principalmente durante sessões de treinamento (73,2%), e muitos buscaram tratamento especializado (81,8%). Conclusão: Foi encontrada uma alta prevalência de RRIs em corredores recreativos, afetando principalmente a parte inferior da perna, o joelho e o tornozelo/pé. As lesões relatadas foram MTSS, fascite plantar e PFP.

ABSTRACT

There are a paradox between running's benefits and its high incidence of injuries. The objective of this study was to describe the prevalence and characteristics of musculoskeletal injuries among Brazilian runners, Methods: A cross-sectional survey was conducted in Goiânia, Goiás, Brazil, involving 100 recreational runners. The survey assessed the prevalence of running-related injuries (RRIs), their frequency, locations, durations, and the pursuit of specialized treatment. Results: A total 52% of the participants reported at least one RRI. The lower leg (46.8%), knee (34%), and ankle/foot (19.2%) were the affected sites. The injuries were the medial tibial stress syndrome (MTSS) (36.2%), plantar fasciitis (19.1%) and patellofemoral pain (PFP) (17%). The RRIs primarily occurred during training sessions (73.2%), and many sought specialized treatment (81.8%). Conclusion**:** A high prevalence of RRIs was found in recreational runners affecting the lower leg, knee, and ankle/foot and. Injuries referred on MTSS, plantar fasciitis, and PFP.

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Introduction

More than a quarter of the world's adult population does not engage in physical activity. Part of this is attributed to sedentary behavioral habits that were brought by the adoption of technology, such as passive/motorized modes of transportation, leisure, work, and screen-based education. These habits lead to a diminished quality of life, an increase in the rates of obesity, comorbidities, and even mortality. Inactive or insufficiently active individuals face a 20% to 30% higher risk of mortality compared to those who engage in physical activity, as stated by the World Health Organization (WHO)[1]. Running is an activity that can be implemented in any region to promote health benefits. Hespanhol Junior et al. (2015)[2], in their meta-analysis, demonstrate that running has a beneficial effect on biomedical indicators such as body mass, body fat, resting heart rate, maximum oxygen volume, triglycerides, and High-Density Lipoprotein (HDL) cholesterol.

However, the beneficial effects of running and the practice of this activity can lead to a high incidence and prevalence of musculoskeletal injuries, as reflected in literature. According with one study[3], the incidence of running-related injuries (RRIs) ranges from 19.4% to 79.3%, with the most commonly affected site being the knee (7.2% to 50.0%), followed by the lower leg (9.0% to 32.2%), foot (5.7% to 39.3%), and thigh (3.4% to 38.1%). Another incidence study[4] provided data of lower limb injuries in ultramarathon runners, the injuries with higher rates were dorsiflexor ankle tendinopathy (29.6%), Achilles tendinopathy (2.0% to 18.5%) and patellofemoral pain (7.4% to 15.6%). However, despite the studies mentioned, there is limited research on musculoskeletal injuries among recreational runners in Brazil. Additionally, there is a lack of information on when these injuries occur and how many participants seek treatment.

Therefore, the main goal of this study was to describe the prevalence and characteristics of RRIs in a sample of Brazilian runners. We expect to find a significant prevalence of RRIs, particularly in the lower leg area. These injuries are thought to commonly occur during training sessions, and it is expected that athletes may not actively seek specialized treatment.

Methods

Study Design

This cross-sectional study was conducted in accordance with the guidelines outlined in STROBE (Strengthening the Reporting of Observational studies in Epidemiology)[5] and was approved by the Research Ethics Committee under protocol number 4.132.491. Participants provided informed consent in compliance with the National Health Council's resolution 466/12 and the Helsinki Declaration.

Participants

The study was conducted during a race performed in Goiânia, Goiás, Brazil with a convenience sample of 100 recreational runners. It was included runners from both sexes with age greater than 18 years old. Participants were excluded if they refused to sign the Informed Consent Form. The recruitment was made through directly communication with the runners. Data collection occurred in January 2020.

Outcomes

The main outcomes of the study were the presence of RRIs, number of injuries, injury locations, moment of injuries and search for specialized treatment.

Data collection

To collect the outcomes, an adapted Morbidity Survey was used according to the specific characteristics of the sport[6]. In terms of injury locations, participants were provided with an illustrative human body diagram to facilitate identification[6,7]. Any musculoskeletal pain or condition resulting from training and/or sporting competitions, significant enough to cause modifications to the normal training regimen in terms of form, duration, intensity, or frequency, was considered a sports-related injury[6,8,9].

Bias

To minimize measurement bias, the adapted Morbidity Survey was employed, using accessible language and designed to be self-explanatory while considering the specific characteristics of the sport[6]. Although measurement bias was mitigated, it is believed that sampling bias could be present due to the location of the examiners; in an area where sports massages and recovery equipment were provided. As a result, there might be a higher likelihood of selecting individuals with a history of injuries.

Data analysis

The sample size calculation was conducted after the official registration numbers were released, which only became available following the event. Using the Raosoft® sample size calculator with a 95% confidence level, a response distribution of 50%, a population of 3,679 registered participants, and a sample of 100 participants, a margin of error of 9.7% was obtained. The data analysis was performed using SPSS (Statistical Package for Social Sciences) version 23.0. The Kolmogorov-Smirnov test was used to assess the distribution of the data. In relation to the main outcomes, numeric data were described as mean and standard deviation while categorical data were described as frequencies and percentages. In the presence of missing data, those data points were omitted, and the remaining data were analyzed.

Results

General data

The study included 100 recreational runners, 61 men and 39 women. The participants had mean age of 34.57 ± 9.74 years, body mass of 71.57 ± 12.59 kg, height of 1.71 ± 0.09 m, and body mass index (BMI) of 24.32 ± 2.86 kg/m². The participants had been running for less than a year (32%) or between one and five years (32%). They reported running with a frequency of two to three times per week (61%) and a weekly running volume of up to twenty kilometers (64%) (Table 1).

Table 1. Personal characteristics, experience, and training aspects.

Age, years	**34.57 (9.74)**
Body Mass, kg	71.57 (12.59)
Heigh, m	1.71 (0.09)
BMI, kg/m²	24.32 (2.86)
Sport Experience (years)	
Less than one	32 (32%)
One to five	32 (32%)
Six to fifteen	28 (28%)
More than fifteen	8 (8%)
Training volume (km/week)	
Up to ten	39 (39%)
Ten to twenty	25 (25%)
More than twenty	31 (31%)

Legend: Kg: Kilogram; m: meters; kg/m^2: kilogram per meter square; Km: Kilometers*; %: percent*

RRI data

Out of the 100 participants, 52 (52%) indicated experiencing at least one RRI. Among the participants with a history of injuries, the majority reported having a single injury (48.1%). The lower leg (46.8%), knee (34%) and ankle/foot (19.2%) were the most affected sites. The main referred injuries were medial tibial stress syndrome (MTSS) (36,2%), plantar fasciitis (19,1%) and patellofemoral pain (PFP) (17%) (Table 2).

Table 2. Prevalence of RRI, number of injuries, site of injuries, and self-reported injuries.

Presence of injury	
Yes	52 (52%)
No	48 (48%)
Number of injuries	
One	25 (48.1%)
Two or more	27 (51.9%)
Location of injury	
Lower leg	22 (46.8%)
Knee	16 (34.0%)
Ankle/foot	09 (19.2%)
Self-reported injury	
Medial tibial stress syndrome	17 (36.2%)
Plantar fasciitis	09 (19.1%)
Patellofemoral pain syndrome	08 (17.0%)
Patellar tendinopathy	07 (14.9%)
Achilles tendinopathy	05 (10.6%)
Iliotibial band syndrome	01 (2.1%)

Additionally, the majority of participants reported that the RRIs primarily occurred during training sessions, and many sought specialized treatment after experiencing these injuries (Table 3).

Table 3. Moment that the injury occurred and search for specialized treatment.

Time of injury	
Training	41 (73.2%)
Competition	15 (26.8%)
Search for specialized treatment	
Yes	36 (81.8%)
No	08 (18.2%)

Legend: %: percent

Discussion

The aim of this study was to investigate the prevalence of running-related musculoskeletal injuries in recreational runners, identify the main affected locations, types of reported injuries, when these injuries occurred, and the search for specialized treatment. The initial hypothesis suggested a high prevalence of RRIs, predominantly during training, and that recreational runners might not seek specialized treatment.

Confirming the formulated hypothesis, a high prevalence rate of RRIs (52%) was noted, with the majority occurring during training sessions (73.2%). This prevalence is consistent with findings from other researchers, particularly among novice runners (less than 5 years of experience), ranging from 19.4% to 79.3% in two systematic reviews and other epidemiological studies[10-16]. This wide variation in prevalence rates is primarily attributed to differences in injury definitions, study designs, and participant levels (recreational or competitive).

The majority of participants were novice runners who reported at least one RRI. Studies have demonstrated that novice runners have a higher incidence of injuries compared to experienced runners over 1000 hours of practice (8.78 vs. 4.24; 17.8 vs. 7.7)[17,18]. These findings may explain the high prevalence of at least one injury reported by most runners in our sample, as it was primarily composed of novice runners.

Regarding the locations of injury, studies[17,18] have reported that the most common sites of injury are the knee joint, lower leg, and foot. In our study, we found a higher prevalence of injuries in the lower leg (46.8%), knee (34%), and ankle/foot (19.4%),

respectively. These findings align with those observed in half-marathon runners in a prospective study[19]. Other studies have also reported the following locations as the most frequent: knee (32.4%), ankle/foot (32.4%), and lower leg (17.6%) (18); knee (45%), ankle/heel (18%), and sole (14%)[15]. Our findings elucidate that, regardless of the competitive level or experience of the runners, the affected areas are the same, and care provided by professionals should encompass all categories and levels of athletes.

The reported prevalence of RRIs in this study indicated a higher presence of medial tibial stress syndrome (36.2%), plantar fasciitis (19.1%), and patellofemoral pain (17%). Different studies reported these injuries as the main RRIs. PFP (16.7%), MTSS (9.1%), and plantar fasciitis (7.9%)[20] and PFP (13.4%), iliotibial band syndrome (ITBS) (12.3%), and patellar tendinopathy (12.3%)[21]; PFP (19,8%), MTSS (16,9%) e thigh strain (8,7%)[22]. These studies indicate PFS as the most prevalent injury, thus differing from our findings. It is noteworthy that, of these studies, only one study focused on recreational runners and had a more substantial sample size than our study, explaining the observed discrepancy[22].

Running injuries are primarily of the overuse type and result from the overload of musculoskeletal structures due to repetitive microtraumas over time. Regions below the knee are more susceptible to such overloads during running, which is why they are the most commonly injured areas, in contrast to the hip region[23]. Divergences in the literature on this topic are common due to different factors such as the definition of running-related musculoskeletal injury, different terrains, types of runners, and diagnoses[4].

Most participants in our study had a weekly training volume of less than 20 km. One of the risk factors described in the literature is related to a weekly training volume of more than 64 km[24,25]. However, volumes below 30 km per week can also indicate a higher risk[26], potentially explaining the high prevalence of injuries identified in our study. Other studies also support the hypothesis that higher weekly training volume is associated with a reduced risk of injury per practice hours[27,28]. A recreational runner should not experience weekly volumes significantly above 64 km or significantly below 30 km, ensuring an adequate workload for essential biological adaptations to prevent injuries without causing excessive strain.

In relation to seeking specialized treatment, our findings indicate that most participants (81.8%) sought treatment. A previous study differs from this finding, indicating that only 31.6% of participants sought treatment[17]. One possible explanation for this discrepancy lies in the study locations (the Netherlands vs. Brazil), which have operational differences in healthcare systems and different population perspectives on seeking specialized care. On the other hand, this difference might also be related to the sampling bias since the data collection was located in an area where sports massage and recovery equipment were offered. Thus, we believe there was a greater selection of individuals with a history of injury.

The main limitations of this study can be highlighted as follows: I) a relatively low number of participants for an epidemiological study (n=100); II) the injury rate based on self-report by the participants and not confirmed through clinical diagnosis by qualified professionals; III) the results represent a population of recreational runners who participated in a regional event, without distinguishing between amateurs and professionals; IV) the cross-sectional study design, which does not allow the identification of causal or etiological factors related to the injuries.

Despite the limitations mentioned, it is essential to emphasize the relevance of this study as a guiding point for future research with a longitudinal design to investigate injury incidence. Furthermore, in future research, it is suggested to employ additional methods for identifying injuries, such as seeking healthcare professionals or assessing time off from running. This approach will enhance the accuracy and significance of the research findings.

Conclusion

A high prevalence rate of RRIs in recreational runners was observed. The most affected areas were the lower leg, knee, and ankle/foot, respectively, with the most prevalent injuries being MTSS, plantar fasciitis, and PFP. The injuries predominantly occurred during training sessions, and most athletes sought specialized treatment upon reporting these injuries.

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