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Prevalence and epidemiological characteristics of sports injuries: A comparative analysis of injured vs non-injured athletes

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ABSTRACT

Background Problems: Sports exercise offers numerous health benefits but is also linked to sports injuries. According to a large body of research, researchers have identified age, gender, injury history, and level of competition as consistent risk factors for injury. **Research Objectives**: This study aims to analyse the injury prevalence of athletes in some sports and compare the epidemiological characteristics related to injury risk factors between athletes who experienced injuries and those who did not. **Methods**: This study employed a quantitative approach with a retrospective cross-sectional design. An online questionnaire collected data from a sample of 172 athletes and sports activists in football, cycling, and running. We conducted descriptive and comparative analyses using the SPSS 29 version. **Findings and Results**: 135 of the 172 respondents experience injuries, with the highest prevalence in football (42.2%), running (36.3%), and cycling (21.5%). Most athletes had recurrent injuries (36.3%). The Mann-Whitney test results showed no significant differences in mean age, weekly training frequency, and training duration between athletes who had injuries and those who did not. **Conclusion**: This study provides important insights into the prevalence and characteristics of injuries among athletes. The results of this study, which compare injured and non-injured athletes, can help develop better injury prevention and management strategies. We recommend increased awareness of injury conditions among athletes, coaches, and medical professionals to ensure a safe return to sport.

Keywords: Athlete; injury; recurrent injury; risk factor; treatment

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INTRODUCTION

Sports exercise has physiological, psychological, and social benefits. It improves self-esteem and social engagement and reduces depression risk but also increases sports injury risk (Prieto-González et al., 2021). Sports injury is a pathological condition that interrupts training or competition and may require medical attention (Micheo & Sánchez, 2018). Sports injuries not only affect an athlete's physical health but can also have a significant impact on their mental health and quality of life. Disability, joint and muscle damage, and

other physical harm can result from injuries. It also influences the psychosocial condition of athletes and the post-injury quality of sports (Gledhill et al., 2018). Athletes of all levels, including professional and amateur, can sustain injuries during training, competition, and pre-session (Odole et al., 2020).

Sports injuries can be caused by overuse syndrome, a long-term effect where athletes carry out training sessions with repetitive and monotonous movements or body postures (Clarsen et al., 2013; Setyaningrum, 2019). Overuse injuries in sports have a multifactorial etiology, but only when defined at the whole-body level. It manifests at the tissue level caused by mechanical fatigue, accumulating tissue damage, and progressive stiffness and strength loss from repetitive loading (Difiori et al., 2014; Edwards, 2018). Professional athletes at the FINA and Masters World Championships often suffer overuse syndrome injuries, accounting for 37.5% of cases. Amateur athletes are more likely to be injured by extremity accidents (Bom et al., 2023).

In high school and collegiate sports, injury rates reach 2.51 and 13.79 per 1,000 athlete exposures, respectively (Chimera & Warren, 2016). Average sports injuries during the competition (13.8 per 1000 athletes) were much greater than during training (4 per 1000). Lower extremity injuries account for almost 50% of athletic injuries. Most sports have ankle ligament sprains, which account for about 15% of injuries (Setyaningrum, 2019). A study of elite players at Korea National Sports University in 2020 found that knees, back, ankles, and shoulders account for almost 60% of sports injuries. Sprains (21%), ligament ruptures (20%), bruising (11%), and fractures (13%) are the most common injuries reported (Lee et al., 2020). Recurrent injuries are prevalent in professional athletes. 39% of athletes in amateur sports activities and 43.5% of international athletes experience repeated injuries to the same body part (Prieto-González et al., 2021).

Based on the latest data from the Minister of Health of the Republic of Indonesia 2018, there has been an increase in the prevalence of injuries that interfere with daily activities by 1% to 9.2% compared to the previous five years, 8.2% in 2013. In Yogyakarta, the prevalence rate is higher than the national prevalence rate of 10.63% (LPB, 2020). The data shown is general injury data caused by work accidents, traffic accidents, and households. No data or research shows the prevalence of sports injuries in Yogyakarta. This study focusses on Yogyakarta, a region with a high injury prevalence but lacks specific data on sports injuries. The study is crucial due to its diverse sporting community and the lack of localised data. It aims to fill a gap in existing research by providing insights into sports injury prevalence in Yogyakarta. This information can inform targeted interventions and policies to reduce injury rates and improve athlete safety in the region, contributing to a better understanding of the local health landscape.

The prediction of musculoskeletal injury risk in athletes is an area of increasing study interest due to the rising level of competition and the importance of player availability on performance in sports organisations (Drew et al., 2017; Eckard et al., 2018; Soligard et al., 2016). A substantial body of evidence has revealed various risk factors related to injury risk, many of which are unchangeable, such as age, gender, history of sports injuries, and level of competition (Eckard et al., 2018). The athlete's age, sports group, training sessions, duration of practicing the sport, and number of events per season showed significant correlations with injuries (Pujals et al., 2016).

This study reviewed previous studies to understand better the factors that influence injuries, but there are still gaps in the existing knowledge. Previous studies have examined injury risk factors and epidemiological characteristics but were only examined based on gender (Gomes et al., 2022; Zech et al., 2022), athletes in specific sports (Linton & Valentin, 2018; Pfirrmann et al., 2016), and athletes at certain levels (Lee et al., 2020; Post et al., 2017; Van Beijsterveldt et al., 2015). Some studies above only focus on analysing the epidemiological characteristics related to injury risk factors in athletes who experience injuries. However, studies examining the epidemiological characteristics between injured and non-injured athletes are still limited. To address the gap, this study aims to analyse the prevalence of injuries among athletes and compare the epidemiological characteristics between injured and non-injured athletes, especially in Yogyakarta. By addressing this research, stakeholders can implement evidence-based prevention and management strategies for injury, thereby encouraging safer and more effective sports participation.

METHOD

Type of Research

This study employed a quantitative approach with a retrospective cross-sectional design. A cross-sectional study design was used because it is the most relevant design when assessing disease prevalence, attitudes, and knowledge among patients and health workers in validation studies that require comparisons (Kesmodel, 2018). This design allows for the collection of data at a single point in time, making it efficient and cost-effective. Additionally, it enables the examination of the relationships between various variables within the study population, providing a snapshot of the current situation.

This design is particularly suited to this study on the prevalence and epidemiological characteristics of athlete injuries across sports, as it allows the researchers to capture a snapshot of the current state of injuries and compare the characteristics between injured and non-injured athletes at a single point in time. By examining both groups simultaneously, researchers can identify key differences in characteristics, risk factors, and potential outcomes, thereby gaining a comprehensive understanding of the factors that may contribute to injury. This comparative aspect of cross-sectional studies is crucial for developing targeted strategies to prevent injuries and improve overall athlete health.

Participants

The population for this study consisted of cycling, running, and football athletes in Yogyakarta. A total sample of 172 athletes was selected using snowball sampling. This method was selected to effectively reach and recruit participants within these specific sports communities, which might be difficult to access through conventional sampling methods. To mitigate the biases, the researcher carefully monitored the sample selection process from the initial participants through to the end of data collection. By closely overseeing each stage, the researcher aimed to ensure a more diverse and representative sample. This approach helped to reduce the likelihood of over-representation from specific subgroups within the population, thereby enhancing the overall validity and generalisability of the study's findings.

Participants who participated in this study were selected based on two criteria. The criteria for athletes were at least 17 years old and had to give their consent to be part of the study. The age criterion ensured that participants were mature enough to understand the study's objectives and implications, as well as to make an informed decision regarding their involvement. Those under 17 or who declined to participate were excluded to maintain the study's ethical standards and ensure the reliability of the data collected.

Instrument

In order to facilitate and expedite the data collection process, an online survey was implemented through Google Forms. The survey instrument was subjected to validity and reliability testing to guarantee the quality of the data collected. The survey's validity was evaluated to ensure that it accurately measured the variables of interest in accordance with the study's objectives. In order to guarantee that the instrument generated consistent and stable outcomes during subsequent administrations, reliability testing was implemented. These measures ensured that the data collected was both dependable and accurate, thereby establishing a strong foundation for the study's conclusions.

Research Procedures

Data collection was carried out from May to June 2023. Before data collection, researchers applied for ethical approval. This procedure is employed to protect research subjects from physical, psychological, social, and legal consequences when participating in research. Ethical approval was obtained from the Ethics Committee of Aisyiyah University Yogyakarta (No. 2843/KEP-UNISA/V/2023). Strict confidentiality protocols were implemented to protect the privacy of participants throughout the investigation. The data were securely stored with restricted access to only authorised research team members, and all responses were anonymised. Participants were guaranteed that their personal information would be maintained in strict confidentiality and utilized exclusively for research purposes in accordance with ethical standards.

Data Analysis

The Statistical Package for Social Sciences (SPSS) 29 version was used in this study to analyse the data. The data was analysed descriptively to determine the number and frequency. Then, the data was also analysed using a comparative test to see significant differences between variables. The normality of the data in each sport was assessed using the Kolmogorov-Smirnov test. The results indicated a significance value of less than 0.05, leading to the conclusion that the data were not normally distributed. Consequently, a nonparametric approach, specifically the Mann-Whitney test, was employed for further analysis.

The Mann-Whitney test was selected for further analysis due to the non-normal distribution. This decision was crucial because the Mann-Whitney test does not assume normality and is appropriate for comparing differences between independent groups in non-normally distributed data. The use of this test affects data interpretation by providing a more accurate assessment of differences between groups without the influence of normality assumptions. It allows for a reliable comparison of medians and distribution shapes between the injured and non-injured groups.

RESULTS AND DISCUSSION

The result of this study showed a descriptive analysis of the prevalence of injuries among athletes in different sports and then compared the epidemiologic characteristics related to injury risk factors between injured and non-injured athletes. 172 athletes participated in this study, consisting of male (83.1%) and female (16.9%) athletes. The respondents were divided into three branches of sports: football (34.9%), running (38.4%), and cycling (26.7%). Most respondents have been practicing their sport for more than one year (91.9%) (Table 1).

Table 1. Demographic Respondents

Categories	Total (n=172)	Percentage (%)
Gender		
Male	143	83.1
Female	29	16.9
Type of sport		
Cycling	46	26.7
Running	66	38.4
Football	60	34.9
Time doing sport		
1 - 6 months	4	2.3
6 - 12 months	10	5.8
> 1 year	158	91.9

The average age, training frequency in a week, and training duration of athletes vary. This is due to the fact that each sport has different timing and duration of training. The average age of cycling athletes is 46-55 years at most (39.1%). Meanwhile, the average age of running athletes was 26-35 years old (20.5%), and football athletes were 17-25 years old (58.3%) (Figure 1).

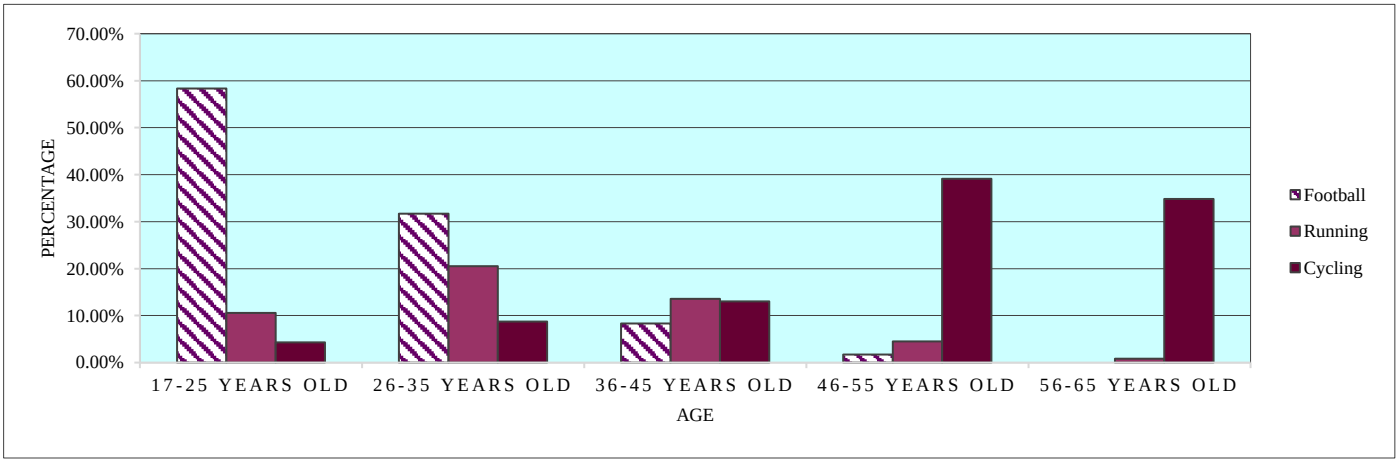

Figure 1. The Frequency of Respondents' Age

Figure 2. The Frequency of Respondents' Weekly Exercise

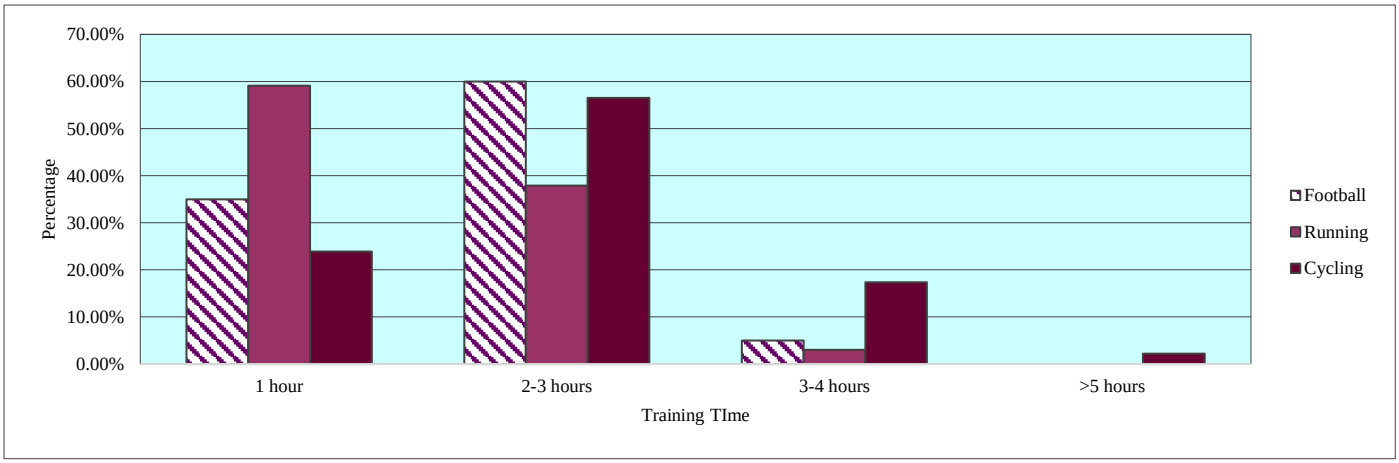

Figure 3. The Frequency of Respondents' Training Time

Figure 2 showed that cycling and running athletes did exercise mostly 3-5 times a week, running (66.7%) and cycling (43.5%). Moreover, the football athletes exercised less than three times a week (41.7%). In addition, athletes of each sport also have different times for doing their exercise. Cycling and football athletes exercise mostly for 2-3 hours, cycling (56.5%) and football (60.0%). Meanwhile, running athletes did 1 hour of exercise (59.1%) (Figure 3).

Table 2 shows that 63.0% of athletes were injured in cycling, and 37.0% were not. 31.0% of them had repetitive injuries. The injury management included going to physiotherapy (34.5%), massage therapists (34.5%), doctors (17.2%), and others (13.8%). 74.2 percent of athletes were injured in running, and 25.8% were not. There were 36.7% of athletes with recurrent injuries. The most common injury management is going to physiotherapy (57.1%), massage therapists (22.4%), others (12.2%), and doctors (8.2%). Meanwhile, the total number of athletes who suffered injuries in football was 95.0%, and 5.0% did not experience injuries. 38.6% were experiencing repeated injuries. The management of injuries is carried out through massage therapists (38.6%), physiotherapists (35.1%), others (14.0%), and doctors (12.3%).

Table 2. Distribution of Injury Data, Recurrent Injury, and Injury Treatment of Athletes in Each Sport

Criteria	Cycling (n=46)		Running (n=66)		Football (n=60)	
	Freq	%	Freq	%	Freq	%
Injured						
Yes	29	63.0	49	74.2	57	95.0
No	17	37.0	17	25.8	3	5.0
Recurrent Injury						
Yes	9	31.0	18	36.7	22	38.6
No	20	69.0	31	63.3	35	61.4
Treatment						
Doctor	5	17.2	4	8.2	7	12.3
Physiotherapy	10	34.5	28	57.1	20	35.1
Massage therapist	10	34.5	11	22.4	22	38.6
Other	4	13.8	6	12.2	8	14.0

The normality test between athletes injured and not injured in each sport is done with the Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test results produce a significance value <0.05, and it can be concluded that the data is not normally distributed. So that the test is carried out using a nonparametric test using the Mann-Whitney test (Table 4).

Table 3. Mann-Whitney Test Results Comparison of Age, Weekly Exercise Frequency, and Duration Between Injured and Non-Injured Athletes

Sport	Variable	Sig. (2-tailed)
Cycling	Age	.640
	Weekly exercise frequency	.108
	Exercise duration	.751
Running	Age	.799
	Weekly exercise frequency	.916
	Exercise duration	.220
Football	Age	.147
	Weekly exercise frequency	.971
	Exercise duration	.953

The Mann-Whitney test has no significant difference if the significance value < 0.05. Based on the table above, the age variable in cycling sports shows Sig. (2-tailed) 0.640, running Sig. (2-tailed) 0.799, and football 0.147. All the values are more than 0.05. So, there is no significant age difference between injured and non-injured athletes. The weekly exercise frequency in cycling sports shows a Sig. (2-tailed) 0.108, running Sig. (2-tailed) 0.916, and football 0.971. The value of the three variables is more than 0.05, so there is no significant difference in weekly exercise frequency between injured and non-injured athletes. Meanwhile, the exercise duration in the cycling sport variable shows a Sig. value. (2-tailed) 0.751, running Sig. (2-tailed) 0.220, and football 0.953. The value is more than 0.05, so there is no significant difference in exercise duration between injured and non-injured athletes.

In this study, the data shows that male athletes are more than female athletes in every sport, especially football. Previous research on the evaluation of male versus female athletes in sports medicine based on systematic review documents found that most studies involved more male athletes than female athletes. Male

athletes are more frequently studied in football, baseball, basketball, rugby, and hockey. Female athletes are often studied in softball and volleyball (Paul et al., 2023). Although this study focused on only three sports compared to the broader range examined in Paul's research, the findings of this study corroborate and support their conclusion that male athletes have greater popularity and participation across various sports, particularly in football. This similarity highlights a consistent trend where male athletes dominate in terms of numbers and representation in sports studies.

A number of factors contribute to the injuries and recurrent injuries, including age, gender, training routine, early return to sports, and biomechanical deficiencies (Ubied, 2014). This study shows notable variations in the age distribution and training frequency across different sports, which can significantly influence the risk of sports injuries. These variations stem from the distinct demands, intensity, and structure of each sport, which can contribute to different injury profiles among athletes. The average age of athletes pursuing football ranges from 17 to 25 years old, while athletes involved in running sports are typically between 26 and 35 years old. In contrast, cycling athletes have an average age of 45 to 65 years old, making them significantly older than their football and running counterparts. This age distribution in cycling can be attributed to findings from a study by Leyland et al. (2019), which highlighted that cycling has become a popular trend among adults. This popularity is due to several factors: cycling is relatively easy to perform, serves as an excellent form of aerobic exercise, is cost-effective, and contributes to the improvement of both health and cognitive function in adults. This finding is consistent with research conducted in Denmark by Hosseinpour et al. (2021), which found that individuals aged 45 to 64 years are more actively involved in cycling compared to other age groups.

The variation in training frequency among athletes of different sports can significantly impact their susceptibility to injuries. Each sport demands a different level of training intensity and volume, which influences the overall injury risk profile for athletes. Overtraining can pose a significant risk to athletes. While a high level of training intensity and volume is essential for athletic growth and performance improvement, it can also lead to negative outcomes, such as injury. Excessive training without proper recovery increases the risk of musculoskeletal injuries and can compromise the body's ability to repair itself (Rodrigues et al., 2023). Athletes who participate in high-frequency training are more susceptible to overtraining symptoms, such as fatigue, injury, and reduced performance. Overtraining syndrome, characterised by a lack of sufficient recovery between intense training sessions, can further lead to chronic injuries and a decline in overall athletic capability (Cadegiani & Kater, 2019).

This study found that football had the highest number of injured athletes among the three sports. This finding is supported by a study of athletes at the Indian Ocean Island Games in Mauritius in 2019, revealing that football also had the most significant percentage of injuries (Garnett et al., 2021). The consistency between our findings and those of Garnett et al. underscores a broader trend where football is associated with a higher injury risk compared to other sports. These similarities reinforce the understanding that the dynamic and physically demanding nature of football contributes significantly to high injury rates. This is because football increases the risk of injury due to body contact. Based on sports participation rates, football has more than 265 million participants worldwide and is the most popular sport, but football carries the most significant risk of injury compared to fifteen other sports (Dhillon et al., 2017; Randers et al., 2021).

The incidence of match injuries in football is particularly higher (almost 10 times) than the injury rates obtained for training sessions. The difference in injury incidence rates between matches and training is attributed to several factors, including the higher physical demands on players during matches compared to training sessions, the number of contacts and collisions during matches, and the fatigue incurred during matches (López-Valenciano et al., 2020). Epidemiology studies show that per 1000 hours of exposure, football players experience 4 to 35 injuries (Forsythe et al., 2022). Likewise, football has experienced a substantial increase in injury rates in recent years. It is correlated with specific categories of injuries, such as strains, fractures, sprains of the lower extremities, and concussions (Watson et al., 2019).

Running is the second most common sport that causes injuries to the athlete, behind football in this study. In addition to being one of the most accessible and well-liked sports, running has grown in popularity over the past half century (van Poppel et al., 2021). Running is suggested to improve fitness and a healthier lifestyle because it increases longevity and reduces cardiovascular disease risk. Despite its benefits, running is

associated with a high incidence of musculoskeletal injuries (Kakouris et al., 2021; Lopes et al., 2012). Lower leg injuries are the most prevalent musculoskeletal injuries associated with running. Overuse causes over 70% of musculoskeletal injuries, with ankle sprains being the most prevalent acute injury (Vincent et al., 2022). The condition often arises from applying deficient force magnitudes across numerous repeating cycles. The prevalence and incidence rates of injuries among runners vary, ranging from 3.2% to 84.9% (Kakouris et al., 2021; Kluitenberg et al., 2015).

The study's findings revealed that several athletes experienced recurrent injuries, defined as injuries affecting the same tissue, such as muscle, bone, cartilage, or ligaments, more than once. Recurrent injuries are often the result of insufficient treatment, premature return to sport, or a combination of both (Shahid et al., 2020). Athletes who return to training or competition too soon are particularly at risk, with the first seven months being a critical period for re-injury (Belozo et al., 2024). Coaches may also contribute to the problem by allowing athletes to participate in important games despite lingering symptoms, further increasing the likelihood of recurrence (Prieto-González et al., 2021).

The root cause of many recurrent injuries stems from inadequate rehabilitation and recovery. Athletes who do not fully heal are left vulnerable to the same injuries reoccurring, particularly when rehabilitation is rushed or incomplete (Ubied, 2014). Injury management is critical in this regard, as ensuring optimal recovery both physically and mentally can significantly reduce the risk of re-injury. Additionally, recurrent injuries often require more rest and a longer recovery period than initial injuries to avoid long-term damage and ensure full restoration of the affected tissues (Pfirrmann et al., 2016). This underscores the need for comprehensive injury prevention and management strategies tailored to the athlete's specific needs to support long-term recovery and performance.

Football players have the highest frequency of recurring injuries, according to the findings of this study. Every sport has a distinct injury profile and risk. Football requires a continual and vigorous cycle of training and play, exposing players to a higher risk of injury from overuse injuries (Gurau et al., 2023). Based on research conducted on high school athletes in the United States, soccer athletes have the highest rate of experiencing recurrent injuries, with the most frequently injured body parts in the head or face, knees, and ankles. Most diagnoses are ligament sprain and concussion (Welton et al., 2018). Other studies have reported that the most common injuries among football athletes are lower extremity muscle and tendon injuries, which typically occur within two months of returning to play (Hägglund et al., 2016).

Sports injury management can be approached through both operative and non-operative treatments, each offering distinct advantages and drawbacks. As previously mentioned in these study data, athletes who sustain injuries or recurrent injuries typically employ physiotherapy to regulate their condition. Physiotherapy helps prevent, treat, and recover from sports injuries. It designs manual therapy, therapeutic exercises, and functional rehabilitation plans to optimise recovery and ensure a safe return to the sport (Martin et al., 2022). Physiotherapeutic treatments commonly used for sports injuries include exercise therapy, cryotherapy, massage, ultrasound therapy, manipulation, joint mobilisation, electrical stimulation, and education (Odole et al., 2020). Injury treatment is usually carried out according to the type of injury experienced. For some injuries, the management can be operative or non-operative, depending on the severity of the injury. Non-operative treatment includes activity modification, anti-inflammatory, and physiotherapy (Degen, 2019). Therefore, athletes need to follow the guidance of a qualified physiotherapist to ensure that the treatment is appropriate for their specific injury.

Operative treatment is typically reserved for more severe injuries, such as complete ligament tears or fractures. It is often preferred for its potential to result in quicker recovery times and increased long-term stability (Evans et al., 2023). However, surgical interventions carry inherent risks, such as infection, scarring, and other complications. Despite these risks, athletes, especially those with higher performance expectations, may favour operative treatment to expedite their recovery and improve functional outcomes. Conversely, non-operative treatment, which includes methods such as rest, physical therapy, and bracing, may be more suitable for individuals with less severe injuries or those who have lower functional demands and are more concerned with avoiding surgical risks (Ochen et al., 2019). Existing literature shows that both operative and non-operative methods can lead to successful outcomes, depending on the severity of the injury and the athlete's

specific needs. Therefore, athletes should actively engage in ongoing education on injury prevention and management strategies. This proactive approach can significantly minimise the risk of future injuries and enhance long-term athletic performance.

In addition, this study compares injured and non-injured athletes by age, weekly training time, and length. Based on the Mann-Whitney test, the significance value of age between injured and non-injured athletes is < 0.05. There was no significant difference in age between injured and non-injured athletes in each sport. The severity of injuries remained consistent across all age groups, and there were no significant differences in severity between different age groups in either youth elite soccer players or adult professionals (Pfirrmann et al., 2016). The previous research also stated that no significant positive correlation existed between age and the increased risk of injuries (Gomes et al., 2022). It is suggested that age alone is not a determining factor in the likelihood or severity of sports injuries, highlighting the need to consider other variables when assessing injury risk and implementing prevention strategies.

Research on Spanish athletes in 25 different sports found that more training sessions, longer time spent practicing the sport, and more matches/contests were associated with more injuries (Pujals et al., 2016). These findings highlight significant differences in injury frequency based on the amount of training, duration of sports practice, and the number of competitions per season among athletes. However, our study contrasts these findings, showing no significant difference in weekly training time and duration between injured and non-injured athletes within each sport. These findings align with research conducted by Linton and Valentin (2018) on runners, which concluded that variables such as age, limb dominance, participation in other sports, weekly running frequency, distance, time, frequency of shoe changes, and running surfaces (track, grass, mulch-terrain) did not significantly differ between injured and uninjured runners. This suggests that while certain factors may be associated with a higher risk of injury, other variables may not play a significant role in injury prevalence, highlighting the complex and multifactorial nature of sports injuries.

The study is subject to certain limitations, including the restricted sample size and the comparatively brief duration of data collection. Future research could address these limitations by employing a longitudinal design, which would allow for the observation of changes and trends over time, providing a more comprehensive understanding of the subject. Additionally, increasing the sample size would enhance the statistical power of the study, making the results more robust and representative of the broader population. By overcoming these limitations, future studies could offer deeper insights and more definitive conclusions.

In addition, the pattern of injuries and the specific anatomical regions that are impacted are not adequately explained, nor is the identification of the structures that sustain recurrent injuries specified. Consequently, subsequent researchers may extend this investigation by focussing on factors that influence the incidence of injuries and injury-related aspects, such as training techniques, the types of injuries most commonly sustained, and the dynamics of coach-athlete interactions. Understanding these risk factors more deeply could lead to more effective prevention strategies and enhance athlete safety and performance. Particular attention must be invested in identifying injury variability among injured athletes in each discipline, particularly those who sustain recurrent injuries.

CONCLUSION

Injuries are prevalent across all sports, largely due to the high-risk factors and the dynamic nature of athletic activities. This study highlights significant insights into the prevalence, characteristics, and recurrence of injuries among athletes, emphasising the need for targeted sports medicine practices and policies. Key findings indicate that football has the highest incidence of injuries, followed by running and cycling, with a notable rate of recurrent injuries, especially in football. The study underscores the importance of tailored injury prevention and management strategies. We encourage coaches and medical professionals to implement comprehensive injury assessment protocols before athletes resume sports activities. Specific recommendations include integrating injury prevention exercises into training regimens, improving recovery protocols, and enhancing athlete education on injury management. Future research should focus on expanding sample sizes and exploring the impact of specific training interventions on injury prevention. Addressing these areas can contribute to more effective strategies for reducing sports-related injuries and improving overall athlete health.

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CONFLICT OF INTEREST

The authors affirm that there are no conflicts of interest to disclose.

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