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A Reflection on the Incidence and Frequency of Different Injury Patterns of Some of the Most Prevalent Orthopedic Sports Injuries in Players

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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Review Article

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ABSTRACT

Background: Orthopedic injuries in sports encompass a diverse array of patterns and incidences across various athletic disciplines.
Main Review: Professional football reveals fluctuating injury rates during competition and training, with thigh-related strains and hamstrings emerging as common occurrences. Equestrian sports notably feature fractures as a significant majority among reported cases, emphasizing their inherent risk. Ice hockey players commonly face shoulder injuries, exhibiting distinct lesion patterns that impact return-to-play durations. Rugby injuries predominantly affect lower limbs, often leading to player removal from the game. In contrast, basketball players grapple with ACL and meniscal injuries alongside heightened ankle sprains and bone stress incidents that hamper performance.
Conclusion: This comprehensive review underscores the complexity of orthopedic injuries prevalent in diverse sports. It emphasizes the variability in injury rates, distinctive injury patterns, and their differential impacts on various body regions. Understanding these nuances becomes imperative in formulating targeted preventive measures and rehabilitation strategies tailored to each sport.

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1. INTRODUCTION

Engaging in sports during adolescence yields physiological, psychological, and social advantages. These benefits encompass enhanced physical well-being, more self-confidence, greater social connections, and reduced likelihood of experiencing depression [1]. Nevertheless, engaging in sports activity is necessarily associated with the occurrence of injuries [2]. Furthermore, this situation is exacerbated by the growing prevalence of sports involvement among teenagers in recent years[3]. Some of the most common orthopedic injuries as a result of sports include anterior cruciate ligament injuries, contusions, stress fracture, rotator cuff injuries etc.

Reportedly, in the United States alone, around 3.5 million individuals under the age of 15 seek medical treatment annually for musculoskeletal injuries sustained during sports practice. Furthermore, 66% of those injuries necessitated treatment in emergency facilities[4]. According to LeBrun et al., it was predicted that there are 23 million adolescents who experience sports injuries every year in Africa[5]. Moreover, Merkel states that the calculated yearly expense associated with the management of sports injuries reaches a staggering two billion dollars inside the healthcare system of the United States[4]. In addition, Knowles cites a potential study carried out in the United States, where the projected yearly expense for high school athletes was assessed at $9.9 million for medical costs, $44.7 million for human capital, and a total cost of $144.6 million[6]. Furthermore, there has been a noticeable rise in the incidence of injuries in football in recent years[7]. The increased prevalence of this phenomena is commonly attributed to a higher degree of sports specialisation and more intensive training at a younger age[8].

Additionally, the prevalence of orthopedic sports injuries, namely those affecting the anterior cruciate ligament (ACL) and rotator cuff injuries, is increasing and is becoming a significant matter of worry[9]. The highest occurrence is observed in adolescents participating in pivoting activities such as football and baseball[10]. Moreover, the occurrence is 3-5 times greater in women compared to men[11]. These injuries can result in significant repercussions for the injured athlete, including not only the expenses associated with treatment and the time missed from participating in sports, but also a significantly heightened risk of developing osteoarthrosis at an earlier stage[12]. However, the incidence of injury in basket ball and softball is quite low[13].

The objective of this literature review is to thoroughly examine and illustrate the scope of orthopedic sports injuries that are common among adolescent athletes. This entails examining the occurrence, trends, and impacts of injuries sustained in sports activities, with a specific emphasis on the increasing occurrence of injuries, and particular pattern of specific orthopedic sport injuries.

2. LITERATURE REVIEW

2.1 Incidence and Frequency of Different Injury Patterns in Professional Football Athletes

The overall injury incidence among professional football players varied from 2.48 injuries to 9.4 injuries per 1000 hours of playing time[14]. The incidence of injuries during competition varied from 8.7 injuries to 65.9 injuries[15]. The injury rate during exposure was 33 per 1000 hours, while the injury rate during training varied from 1.37 injuries14 to 5.8 injuries per 1000 hours[16]. Ekstrand et al reported a total of 2908 muscle injuries, with 53% happening during competitive events and 47% occurring during training sessions[14]. Dauty and Collon documented a cumulative count of 903 injuries among a sample of 173 professional French soccer players[17]. Morgan and Oberlander assessed a total of 399 injuries, out of which 256 (64%) met their specific criteria for injury, which involved causing individuals to miss time from participating in activities[18]. Strains, sprains, and contusions were the most prevalent types of injuries[19]. The thigh was the body component that experienced the highest frequency of injuries, as observed in research[20]. Additionally, two investigations found that the hamstrings were the most commonly afflicted area within the thigh[16, 17]. The majority of thigh injuries were classified as strains, with a significantly higher occurrence in the posterior region ($P < .05$)(21). Quadriceps strains resulted in a more extended period of inactivity compared to hamstring injuries ($P = .009$)[14]. The groin, knee, and ankle were also often reported as sites of injury[8, 14]. Fractures accounted for a minor proportion of all

injuries[21]. Nevertheless, the majority of fractures were categorized as significant injuries[21]. The incidence of injury was significantly greater during matches (P = .001) compared to training sessions (P < .001) [21]. Morgan and Oberlander noted that more serious injuries were recorded during matches (P < .001)[18].

2.2 Incidents and Different Injury Patterns in Equestrian Sports

Equestrian competitions are widely regarded as highly perilous, as the act of riding horses entails the greatest likelihood of death compared to all other sports, and the potential for severe damage surpasses that of motorcycle riding[22]. Jagodzinski and DeMuri observed that there are 18.7 injuries resulting from equestrian sports for every 100,000 individuals[22]. Orthopedic injuries make up a significant proportion of these riding injuries, amounting to almost 70%, as reported by Loder[23].

The Centers for Disease Control and Prevention conducted a thorough analysis using data from 2000 to 2010(24). This analysis estimated that there were 18.7 injuries per 100,000 instances of riding. The equestrian organizations provided the most conservative estimates of injury incidence[25]. According to the United States Pony Club, they have reported one accident for every 158,607 hours of all activities conducted by their organization [25]. According to the North American Horsemen's Association, it has been reported that a mere 0.15% of riders within the association encounter a noteworthy injury on an annual basis [25]. Costa-Paz et al reported the greatest injury rate among polo players, which was 7.8 per 1000 game-hours[26].

Regarding injury patterns, Press et al. conducted a study on injuries specifically in professional horse racing jockeys[27]. On the other hand, Winslett and Bernhang provided injury data from the American Horse Shows Association, which oversees equestrian athletic events across all disciplines[28]. Among the patients in the US, a significant majority (64.5%) were female, and a considerable proportion of the patients under examination were youngsters[29]. A small fraction of cyclists were professionals. Falling from a horse was the primary cause of injury in the United States, with being kicked by a horse being commonly recorded as the second most prevalent reason. Dislocations, which were observed in a limited number of studies, accounted for a minor proportion of total injuries. On the other hand, fractures accounted for an average of 33.6% of injuries. The upper extremities had the highest occurrence of fractures at 50.7%, followed by the lower extremities at 22.9%. Fractures in the pelvis, torso, and spine were less frequent. The prevalence of fractures in the UK accounted for 17.4% of all equestrian injuries reported, which is notably lower than the 33.6% reported in the US (P < .0001).

2.3 Incidents and Different Injury Patterns in Ice Hockey Players

According to the findings of Hutchinson and colleagues, there was a higher incidence of 119 injuries for every 1000 athlete exposures. Their definition of an injury was any incidence that required evaluation or assistance from the medical staff while the athlete was participating in a game; however, they did not clarify what defines an athlete-exposure or injury[30, 31]. In the course of a single season, fifty-nine percent of the NHL players who participated in regular season games were sidelined for at least one game due to an injury. This proportion reached 63.1% after gradually increasing over the course of three seasons[32]. Shoulder injuries were around 10-12% of the overall injuries sustained by National Hockey League players, which includes injuries to the head and neck. The average number of games missed per shoulder injury was 10.2[32].

It is possible that the incidence of shoulder injuries among hockey players is different from that of the general population. This differences can be attributed to the aggressive and forceful nature of ice hockey[33]. Dwyer et al. utilized Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA) in order to investigate the damage patterns that were present in professional ice hockey players who sought medical assistance after suffering acute shoulder instability[34]. The most prevalent lesions observed in NHL players were Bankart lesions affecting the anteroinferior glenoid labrum, with 14 players affected. This was followed by Hill-Sachs lesions affecting the posterolateral humeral head, with 10 players affected[33]. Other types of lesions were found in 5 NHL players, while superior labrum anterior and posterior (SLAP) lesions and posterior labral lesions were each identified in 3 NHL players[34]. The majority (79%) of athletes having “Bankart lesions” also exhibited “Hills-

Sachs lesions". Upon positional analysis, it was shown that defensemen exhibited the lowest incidence of Bankart lesions[34]. A researcher named Rangavajjula et al conducted a study especially on labral tears, where they evaluated the results of arthroscopic labral repair. This study aimed to investigate the time it took for athletes to return to the game and their performance after the surgery, which had not been previously explored[35]. Thirteen labral injuries were reported among eleven NHL players. There were a total of thirteen injuries, eight of which were sustained by the player's dominant shoulder[35]. A total of eight of these injuries were considered to be acute, with four of them being the result of contact with another player and four of them being the result of contact with the benches. In addition, five of the injuries were chronic, meaning that they occurred over the course of numerous seasons of play[35]. 4.3 months was the average amount of time it took for all of the players to get back into the game. While there were no significant variations in the amount of time it took to return to play between injuries to the non-dominant shoulder and injuries to the dominant shoulder, there were also no differences between defensive and offensive players, nor were there any differences between chronic and acute injuries. It was impossible to identify any significant differences in the performance that was displayed on the ice[35].

2.4 Incidents and Different Injury Patterns in Rugby Players

Rugby union, sometimes known as rugby, is a highly popular team sport worldwide. Its popularity has been steadily growing, with a notable 19% increase in the number of people playing the sport between 2007 and 2011[36]. Rugby matches are known for having different phases of low-intensity activity and sudden bursts of high-intensity running and physical collisions between players on opposing teams[37]. The number of injuries to the lower limb was much higher (all $P < .001$) than the number of injuries to the trunk, upper limb, head or neck areas [36]. The frequency of visits was greater for all anatomical locations in semiprofessional player group when compared to amateur players groups and recreational groups (all $P < .001$). The occurrence of injuries to the lower limb had the highest probability of causing the player to be taken out of the game (27% of all lower limb injuries resulted in removal), in comparison to injuries in other body regions ($P < .001$). The probability of being removed was greater for attendances to the trunk (22%) in comparison to the upper limb (19%; $P < .05$). However, it was observed that attendances to the head/neck region had a lower likelihood of being removed compared to all other regions. This difference was statistically significant with a p-value of less than 0.05.

2.5 Incidents and different injury patterns in Basket Ball Players

In the NBA, the occurrence of ACL injury varied between 0.64% and 2.7% of players, with an average of 2.5 ± 1.7 injuries per season(38,39) . According to the data, the occurrence of lateral meniscal injury was higher (58.0%-59.2%) compared to medial meniscus injuries (40.8%-42.0%)(38, 39). Younger athletes had a higher incidence of LMI, particularly those under the age of 30[38,39] . In addition, individuals with a BMI greater than 25 had a significantly higher incidence of LMI compared to MMI, 1.7; 95% confidence interval, 1.03-2.29; $P < .05$). A body mass index more than 25 was found to significantly increase the risk of meniscal tears in general(38, 39). A p-value of less than 0.05 was associated with the "incidence rate ratio", which was 1.6 with a 95% confidence interval of 1.2-2.3 [38,39]. According to Krinsky et al, players with medial meniscal injuries missed a considerably greater number of games compared to those with lateral meniscal injuries [38]. In contrast, Yeh et al discovered that athletes with lateral meniscal injuries had an average absence of 43.8 ± 35.7 days, whereas those with medial meniscal injuries missed 40.9 ± 29.7 days[39]. However, this disparity did not reach statistical significance.

According to statistics from the NBA electronic medical record database, the probability of experiencing an ankle sprain in a single season was 25.8% (95% CI, 23.9%-28.0%)[40]. The findings provide light on the consistent occurrence of ankle sprains among basketball players who compete at the top level. In comparison to earlier assessments, the number of ankle sprains has increased from 3.2 to 3.5 per 1000 player-games to 4.5 per 1000 player-games. This represents a significant increase[40]. The incidence of sprains was highest during games, accounting for 71% of cases[41]. Additionally, 56% of sprains did not result in players missing subsequent games, practices, or activities[41]. According to the study, professional players experienced a higher number of ankle sprains compared to athletes in the National Collegiate Athletic Association

(NCAA). The occurrence of ankle sprains among professionals ranged from 1.4 to 2.3 sprains per 1000 player-games[40]. In contrast, it has been observed that NBA athletes who are younger than 26 years old face a greater likelihood of experiencing ankle sprains when compared to their older counterparts, with an incidence rate ratio of 1.54 and a 95% confidence interval of 1.27 to 1.86[40].

According to Khan et al's study conducted between 2005 and 2015, they examined bone stress injuries in the lower extremities. Their findings revealed that the majority of these injuries, specifically 76.1%, were situated in the ankle or foot region[42]. The rate of progression to fracture in individuals with stress reactions was 13%. In addition, it was observed that individuals who encountered stress injuries exhibited a major decrease in the number of games participated in subsequent to the occurrence of the injury[42]. Specifically, the average number of games played in the two years following the injury (61.3 ± 20.2) was significantly lower compared to the two years prior to the injury (72.0 ± 12.7) (P = .014)[42]. According to the study, the fifth metatarsal was found to be the most common location for stress fractures, making up 18.4% of the cases. Other stress fractures in the foot accounted for 14.5% of the cases. Achilles tendon ruptures are also common in players, particularly during early season and preseason play, accounting for approximately 45.5% of all ruptures [42].

3. CONCLUSION

This review underlines the intricate landscape of orthopedic injuries prevailing across a spectrum of sports, revealing nuanced injury rates, distinct patterns, and varied impacts on different body regions. From the fluctuating injury rates in football to the prevalence of fractures in equestrian sports and the specific lesion profiles affecting return-to-play in ice hockey, each sport manifests unique injury dynamics. Recognizing these variances is crucial for tailoring targeted prevention and rehabilitation strategies, highlighting the importance of ongoing research and heightened awareness in mitigating sports-related orthopedic injuries, ultimately contributing to athletes' well-being and performance longevity across diverse sporting disciplines.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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