REVIEW ARTICLE

Injuries in high-performance fencers – a review

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Manuscript Preparation
E Funds Collection

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Abstract

Background and Study Aim: Competitive fencing is a demanding sport with a long history and a promising future. Fencing is very dynamic sport that exposes practitioners to injury. The cognitive purpose of this study was review the prevailing type and location of injuries, basic on the following criteria: how high the incidence rates of the resulting damages is, and what are the risk factors, such as gender or weapon.

Material and Methods: A literature search of four databases (PubMed, Google Scholar, SPORTDiscus, and Scopus) was conducted using different combinations of the following terms: "fencing injuries" OR "competitive fencing injuries" AND "fencing" AND "injuries".

Results: The literature search retrieved a total of 190 articles from the four databases; 7 articles met all inclusion criteria and were included in this review. The article review found that fencing has a low injury rate. The lower limb was the most common injury location for any weapon and there were no differences between men and women. The most frequent type of injuries were strains and sprains.

Conclusions: Fencers are mainly exposed to lower limb injuries. Therefore, preventive actions should take this factor into account as the primary criterion. However, there is a lack of research showing the incidence of fencing injuries. so the injury rate may be low.

Key words: combat sport • épée • foil • sabre

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IOC – International Olympic Committee.

FIE – International Fencing Federation (***Fédération Internationale d'Escrime***).

Injury – ***noun*** damage or a wound caused to a person's body.

Performance – ***noun*** the level at which a player or athlete is carrying out their activity, either in relation to others or in relation to personal goals or standards [20].

Épée – is the heaviest of the three modern fencing weapons (foil, épée, and sabre), each a separate event, épée is the only one in which the entire body is the valid target area [20].

INTRODUCTION

Competitive fencing is a demanding sport with a long history and a promising future [1]. Fencing was one of the first sports practiced in the Olympics. Historically, in 1896 it was admitted as a combat sport to the first modern Olympics in Athens. At the beginning, only two weapons were included during those competitions in the Greek capital: the men's foil and the men's sabre. The épée was introduced four years later in Paris. For ages, fencing was a sport mainly for men. Nowadays, fencing is practiced by men and woman with three different weapons, the épée, the foil, and the sabre, with specific rules and strategies for every weapon [2].

In recent years, fencing was only part of four categories in the Olympics Games. Every four years, the weapons appearing in the Olympic Games change. The sport discussed in this article is rapidly growing. In November 2017, the IOC acknowledged these efforts, as well as the significance of fencing in the Olympic program, by awarding the FIE two additional medal events for the 2020 Games in Tokyo. This represents a big moment for competitive fencing [3].

To ensure their protection, fencers must wear specific fencing dress, mask, gloves, plastrons, and socks. Fencing equipment must conform to exacting standards, which are periodically revised on the basis of theoretical indicators or medical evidence showing the need to upgrade them. With the advancement of protective gear, acute traumatic injuries, such as lacerations and punctures, are extremely rare. Naturally, despite taking these precautions, injuries may occur [4].

According to numerous research, fencing is one of the combat sports with the lowest risk of injury. A sports injury is defined as damage to a part of the body causing time off from practice or competition. More precisely, it includes any circumstance for which the athlete required medical assistance and led to their absence from competition or training.

Two studies were conducted after the Olympic Games in Beijing (2008) and in London (2012). The purpose of the present study is to analyse the frequency, characteristics, and causes of injuries incurring during the Summer Olympic Games. After Beijing (2008), injuries were reported from all sports. The risk of incurring an injury was highest in soccer, taekwondo, field hockey, handball, weightlifting, and boxing and lowest in sailing, canoeing/kayaking, rowing, synchronized swimming, diving, fencing, and swimming [5]. In the research performed after the London Games (2012), higher injury rates were found among athletes competing in several sports disciplines; for example, in fencing, it increased by 7% in comparison to the post-Beijing Games studies [6].

Competitive fencing is a very dynamic sport. The continuous dynamic motions that are associated with fencing are considered to expose the musculoskeletal structures to high transient forces [7]. These high transient forces of the musculoskeletal structures are produced in fencing due to the nature of the sport's movement, especially during a lunge [8].

Fencing is a skill that requires strength, speed, and power. Especially for the lunge action, the knee joint continues to bear a huge ground reaction force, which can easy cause an injury to the knee joint [9]. It has also been demonstrated that the majority of these injuries are experienced by fencers in their lower extremities [10]. There are only a few studies describing injuries in fencing. However, this is a developing sport with intense effort that exposes fencers to injuries.

The cognitive purpose of this study was review the prevailing type and location of injuries, basic on the following criteria: how high the incidence rates of the resulting damages is, and what are the risk factors, such as gender or weapon.

MATERIAL AND METHODS

Literature search

A literature search of four databases (PubMed , Google Scholar, SPORTDiscus, and Scopus) was conducted using different combinations of the following terms: "fencing injuries" OR "competitive fencing injuries" AND "fencing" AND "injuries." The literature search was completed in March 2020.

Study selection

The studies were chosen based on the following inclusion criteria: (1) articles written in the English language, (2) articles with the full-text original available, (3) studies performed on competitive fencers, (4) studies with more than 10 participants. Studies were excluded if: (1) the main task

was not specific for one sports discipline, (2) the aim of the study was different than fencing injuries, (3) the publication type was research.

Methodological quality

The quality of the included articles was assessed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart, Lung, and Blood Institute), which consists of 14 items. The questions on the form are designed to help one focus on the key concepts for evaluating the internal validity of a study.

Data synthesis

The literature search retrieved a total of 190 articles from the four databases. After title/abstract selection and removing duplicates, 30 potential articles were selected. The full text of these 30 articles was evaluated in detail. Finally, 7 articles [1, 3, 10-14] were determined to meet all inclusion criteria and were included in this review. Figure 1 presents the flowchart for the literature search process.

Quality assessment

All of the included studies were assessed. Table 1 illustrates the points of the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies for all of the included studies. A critical assessment involves considering the risk of possible bias in choosing, information bias, measurement bias, or confusion. A high risk of bias translates into a poor quality assessment. Therefore, attention was given to the number of "no" answers in the assessment.

1. Was the research question or objective in this paper clearly stated? 2. Was the study population clearly specified and defined? 3. Was the participation rate of eligible persons at least 50%? 4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? 5. Was a sample size justification, power description, or variance and effect estimates provided? 6. For

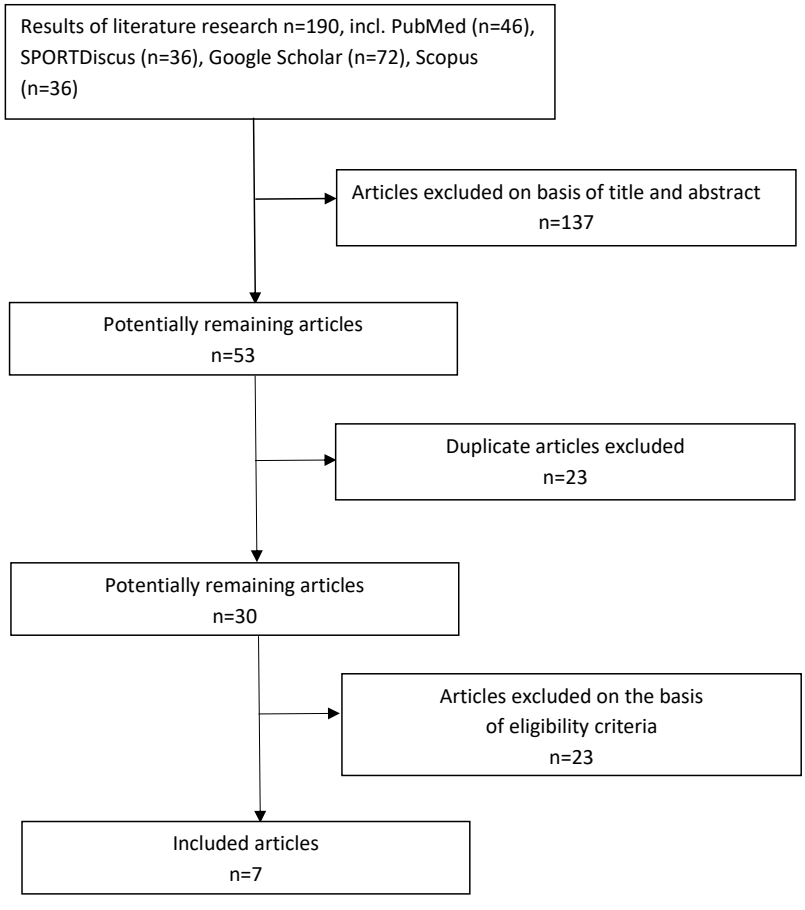

Figure 1. Flow chart for the study search and selection.

Table 1. Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies – ordinal variable: previous year of publication (source).

Source	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Harmer et al. 2008 [1]	yes	yes	yes	no	no	n/a	n/a	n/a	yes	n/a	yes	n/a	n/a	yes	6
Chung et al. 2012 [10]	yes	yes	yes	no	yes	n/a	n/a	n/a	no	n/a	yes	n/a	n/a	no	5
Alekseyev et al. 2016 [11]	yes	no	yes	no	no	n/a	n/a	n/a	no	n/a	yes	n/a	n/a	no	3
Park et al. 2017 [12]	yes	yes	yes	no	no	n/a	n/a	n/a	yes	n/a	yes	n/a	n/a	yes	6
Harmer et al. 2019 [3]	yes	yes	yes	no	yes	n/a	n/a	n/a	yes	n/a	yes	n/a	n/a	yes	7
Prakash et al. 2019 [13]	yes	yes	yes	yes	no	n/a	n/a	n/a	no	n/a	yes	n/a	n/a	yes	6
Walrod et al. 2019 [14]	yes	yes	yes	no	yes	n/a	n/a	n/a	no	n/a	yes	n/a	n/a	no	5

n/a – not applicable

the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? 7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? 8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)? 9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? 10. Was the exposure(s) assessed more than once over time? 11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? 12. Were the outcome assessors blinded to the exposure status of participants? 13. Was loss to follow-up after baseline 20% or less? 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

RESULTS

Study characteristics

All studies includes competitive fencers in three weapon categories (épée, foil, sabre). The total sample of athletes is 164,190. The studies were conducted in various countries. Most of the studies have been carried out over several years (Table 2).

Data analysis

Location of injury

According to all studies, the most common injury location was the lower limb. In four studies, the ankle was the most commonly injured. In the first study involving 113 participants, 14 injuries were found at the time of the study and 15 injuries occurred in the previous 24 months. Nine injuries were related to the ankle, which represented 64.2% of present injuries. Concerning the past 24 months, four injuries were noted as affecting the ankle. The knee, foot, and back were the next most common locations for injuries [14]. In the second study, 1,176 injuries were considered, of which 47.2% involved the lower limb. Once again, the ankle was the most common location with 134 injuries (11.4%). The knee was the next most common location with 119 injuries, followed by the lower back with 113 injuries [12]. In the third study, there were 174 injuries and 46 of them concerned the ankle. In this study, knee injuries occurred 41 times [3]. The fourth study involved 16 injuries, 3 concerning ankle sprains, while the other injuries affected various other locations of the body [11].

In addition to the above studies, the remaining three studies showed that the most common injury appeared in the knee, but ankle injuries also occurred very often. In the first of these studies, there were 62 injuries of the lower limb (69.4%) and 26 of these were knee injuries [10]. 243 injuries were presented in the second study, from which 55 were knee injuries and 39 concerned the ankle [13]. In

Table 2. Group characteristics – ordinal variable: previous year of publication (source).

Source	Group characteristics					Time of study	Assessment/ tools	Fencer's country
	Total	Female	Male	Age	Weapon			
Harmer et al. 2008 [1]	78,223	30,740	47,483	n/a	epee 27,004 foil 31,869 sabre 19,350	5 years	injuries reports	USA
Chung et al. 2012 [10]	10	0	10	27.0 ±5.5	n/a	3 years (November 2006 – October 2009)	monthly interviews with standardized injury recording	China
Alekseyev et al. 2016 [11]	115	36	79	30.07	epee 101 foil 17 sabre 4	n/a	retrospective questionnaire	USA
Park et al. 2017 [12]	15	8	7	n/a	n/a	8 years (January 2008 – December 2015)	report forms issued by the IOC.4	Korea
Harmer et al. 2019 [3]	85,686	37,817	47,869	n/a	epee 34,007 foil 26,445 sabre 25,234	5 years	medical records and/or competition supervisor reports, interview	all world
Prakash et al. 2019 [13]	113	34	79	18-26	n/a	November 2016 – January 2017	scheduled interview	India
Walrod et al. 2019 [14]	28	9	19	n/a	injuries 16 epee 9 foil 4 sabre 3	1 year (January 1st, 2017 – December 31st, 2017)	n/a	USA

n/a – not applicable

the last study, once again the most common injury location was the knee (36), accounting for 19.6% of all injuries. The next most commonly appearing injuries concerned the thigh (28 cases) and the ankle (24) [1].

Type of injury

With regard to the type of injury, four studies have recorded which types of injuries occurred most frequently; in most cases, the injuries were related to muscle joint sprain. These injuries mainly concerned the lower limb. Muscle strain at the knee and thigh regions was 22.6% of all injuries (14 injuries out of 62 total).

Whether it comes to a joint sprain, on the lower limb it occurred the most often with the ankle and the knee, respectively 14.5% for the ankle and 11.3% for the knee [10]. In the next study, approximately 52% of all reportable injuries were strains and sprains, respectively 26.1% for strains and 25.5% for sprains [1]. In the third study, the most common injuries were first-degree and second-degree sprains (40.8%), strains (20.1%), and ruptures (9.8%). The number of cases of ankle sprains was 44, knee sprains 19, and thigh strains 22 [3]. In the last study presenting the type of injury, 88% concerned musculoskeletal injuries. The most common recorded injuries were ankle and foot sprains [11].

Time-loss injury and treatment

In the first study, injuries involving the loss of time representing more than 22 days were recorded as a major injury. These injuries included hamstring tears, anterior cruciate ligament ruptures, and fractured ankles [10]. In the second study, injuries were categorized as mild, moderate, or severe. Mild comprised 105, moderate 108, and severe 37. This study included 97 participants who had injuries, of which 58 participants sought treatment (50.4%) and 51 suffered from injury recurrence. Out of those who received treatment, 45 were treated by a medical doctor, 25 by a coach, 13 by themselves, 3 by chiropractors, 2 by trainers, and 2 by a physical therapist or in various combinations. Out of the participants that sustained some sort of injury, 41 had a setback during practice or competition [13]. In the next study, fencers had 14 injuries at the time of the study. The injuries were then divided into acute injuries and gradual onset; there were 11 acute injuries and 3 gradual onset. Acute injuries having a sudden onset were more common

(78.5%) than injuries of a gradual onset (21.4%). The study did not include data on the treatment of fencers and time lost from training/competitions [14]. The next study showed that 12 (75%) of 16 injuries led to a loss of time of less than or equal to 2 weeks. 11 fencers sought treatment. Of those who had a time loss of greater than 2 weeks, 3 (75%) of 4 went on to have a surgical intervention for treatment. In this study, there were 8 acute injuries and 8 chronic injuries [11]. In the next study, injury severity was defined as various levels: Level I (mild) injury requiring treatment for 1-3 days, level II (moderate) injury requiring treatment for 4-7 days, and level III (severe) injury with treatment for ≥8 days. More than half of the reported injuries (52.6%) indicated Level I injuries, followed by Level II and III injuries with an overall prevalence of 18.9% and 28.6%, respectively [12]. In another study, loss of time with regard to training or competition was 97.7% of all 176 injuries. The overall median time loss was 4 weeks; 32.1% of injuries involved 2 weeks or less away from fencing participation. Sprains and strains had similar time-loss profiles, respectively 6.1 and 5.5 weeks. Ruptures resulted in the most prolonged absence from participation with a mean of 29 weeks [11]. In one of the studies, no information about treatment or time loss was provided [1].

Injury rate

The incidence rates in one of the five studies was determined as the number of injuries per 1,000 hours of exposure during training or competition. This amounted to 5.1/1000 hours during competitions and 2.0/1,000 hours during training [10]. Another study calculated an overall injury rate of 2.43/1,000 for all fencers who took part in the given study [11]. In the third study, the rate of time-loss injury was calculated per 1,000 AE, where AE means athlete exposures; this amounted to 0.3 per 1,000 AE [1]. In the next study, the total injury rate per athlete was 3.3 injuries/year. The average time spent in training was 1,074 hours/year and the overall injury rate was 3.0 injuries/1,000 hours of training. In this study, in terms of exposure the total injury rate was 13.7 injuries/1,000 AE [12]. In the last study, the overall incidence of time-loss injuries was 0.28/1,000 AE, were the AE means athlete exposures for fencing. This study comprised 637,776 AE for 85,686 participants. Otherwise, the recorded injury rate was 0.41/1,000 athletes/year or 5.1/1,000 hours of participation [3].

Additional factors: sex, weapon

In five studies, the authors compared the results based on characteristics such as sex or weapon. The results were varied. In one of the studies, the analysis showed the épée was the weapon with which the most injuries resulted (15.69%), followed by the foil (10.34%) and saber (9.09%). There were 14 injuries present and 10 of them belonged to men. However, it should be noted that the number of men who participated in the study was almost twice as high as women [14]. The second study shows that in a study group consisting of 19 men and 9 women, 11 men and 5 women were injured, of which 8 men and 4 women received appropriate treatment. The study revealed characteristics in relation to the relevant weapon. The fencers using the épée suffered 9 out of 16 injuries, while 4 occurred with foil and only 3 occurred with the sabre [11]. In another study, women had a significantly higher overall risk of a time-loss injury than did men. This is indicated by the difference in injury rates; for men it was 1.01 and for women it was 1.81. In terms of sex differences in injury location, women had more hip injuries than men but fewer knee injuries. However, saber fencers had a 62% higher risk of incurring a time-loss injury compared with foil and épée fencers. The injury rate for foil and épée fencers was almost equal [1]. In the fourth study, male and female athletes differed significantly in terms of the severity of their injuries, as did athletes involved in fencing using different weapons. For all weapon categories, Level I injuries prevailed, followed by injuries of Levels III and II. For the sabre, the differences for male and female athletes involved the location of the injury. For Level I injuries, the most common injury location for men was the upper limb and for women the lower limb, while at Levels II and III for men and for women, the most common injury location was the lower limb. For the épée and foil, male and female athletes showed similar trends in terms of the most likely injury locations as well as in terms of injury severity [12]. In the last study, for men, the épée had a statistically significantly lower risk than the foil and sabre. The foil and sabre were not significantly different from each other. However, there were no significant differences across the range of weapons for women. Male sabre fencers had the highest rate overall and this was significantly higher than female sabre fencers. In this study, it was found that men had an approximately 42.6% greater risk of injury than women [3].

Table 3. Summary of Included Studies – ordinal variable: previous year of publication (source).

Source	Participants (n)	Injuries (n)	Training/ competition Injuries (n)	The incidence rates	Injuries location (the most common)	Type of injuries	Severity of injuries	Risk factors	Treatment and time loss
Harmer et al. 2008 [1]	78,223	injuries n=610 time loss injuries n=184	n/a	0.3/1,000 AE	knee n=36 thigh n=28 ankle n=24	strains 26.1 % sprains 25.5% contusion sublux/disloc	n/a	Gender: male n= 98 1.01/1,000 AE female n=86 1.81/1,000 AE 1.35 (1.01–1.81) Weapon: epee n=54 0.25/1,000 AE foil n=68 0.27/1,000 AE sabre n=64 0.42/1,000 AE	n/a
Chung et al. 2012 [10]	10	injuries n=62	training n=44 competition n=18	2.4/1,000 hours During competition: 5.1/1,000 hours During training: 2.0/1,000 hours	lower limb (69.4%) n=43 knee n=26 ankle n=12	muscle strain at knee and thigh regions (22.6%) n=14; ankle sprain (14.5%); n= 9 knee sprain (11.3%) n=7	Major injuries (more than 22 days) included hamstring tear, anterior cruciate ligament rupture, and fractured ankle	n/a	n/a
Alekseyev et al. 2016 [11]	115	97 participants had injuries Injuries n=243	n/a	n/a	Knee n=55 Ankle n=39	n/a	Mild (n=105): knee (21), wrist (15), ankle (14), elbow (13), foot (11), lower back (10), shoulder (10), neck (6), hip (2), hamstring (2), and heel (1) Moderate (n=108): knee (25), ankle (18), foot (11), wrist (10), elbow (10), lower back (10), shoulder (9), hands (5), hip (4), neck (4), and hamstring (2). Severe (n=37): knee (9), lower back (8), ankle (7), elbow (5), shoulder (5), foot (2), wrist (2), hip (2), hands (1), and hamstring (1)	n/a	58 participants sought treatment (50.4%). Participants with no treatment (39%). Participants declined to answer (10.4%). 51 participants suffered from injury reoccurrence.
Park et al. 2017 [12]	15	Injuries n=1,176	Training 95 % Competition 5 %	3.3 injuries/year 3.0/1,000 hours 13.7/1,000 AE	ankle n=134 knee n=119 lower back n=115	n/a	Mild 52.6% (sabre n=258, epee n=199, foil n=161) Moderate 18.9% (sabre n= 83, epee n= 78, foil n=61) Severe 28.6% (sabre n= 130, epee n=109, foil n=97)	Gender : male n=577 female n=599 male 14.4/1,000 AE female 13.1/1,000 AE Weapon : epee n=54 3.0/1,000 hour foil n=68 2.5/1,000 hour sabre n=64 3.7/1,000 hour	n/a
Harmer et al. 2019 [3]	85,686	injuries n=176	n/a	0.28/1,000 AEs 5.1/1,000 hours	Ankle n=46 Knee n=41	first-degree and second-degree sprains (40.8%) strains (20.1%); ruptures (third-degree sprains/ strains) 9.8%, sprain ankle n=44 sprain knee n=19 strain thigh n=22	n/a	Gender: male (0.32/1,000 AE) female (0.22/1,000 AE) Weapon: epee 0.17/1,000 AEs foil 0.31/1,000 AEs sabre 0.36/1,000 AEs	The overall median time loss was 4 weeks 32.1% of injuries involved 2 weeks or less

Source	Participants (n)	Injuries (n)	Training/ competition Injuries (n)	The incidence rates	Injuries location (the most common)	Type of injuries	Severity of injuries	Risk factors	Treatment and time loss
Prakash et al. 2019 [13]	113	Present Injuries n=14 Past Injuries n=15	n/a	n/a	Lower limb: Present injuries: ankle (9) 64.28% knee (2) 14.28% foot (7.14%) Past injuries 24 months: ankle n=4 knee n=1	n/a	Present Injuries: acute injuries n=11 gradual onset n=3	Gender: males injuries n=10 female injuries = 4 Weapon: epee n= 8 foil n= 3 sabre n= 3 Level: international n= 7 national n=6 university n=1	n/a
Walrod et al. 2019 [14]	28	injuries n=16	training n=14 competition n= 2	2.43/1,000 AE (7,840 athlete exposures (AE))	ankle/foot sprain and shoulder pain, both being recorded n=4 injuries	ankle sprain groin strain dyskinesis	acute injuries n=8 chronic injuries n=8	Gander: male n=11 female n=5 Weapon: epee n= 9 foil n= 4 sabre n= 3	Treatment n=11 12 injuries caused a time loss of less than 2 weeks

NA – not applicable

DISCUSSION

Injury rates were relatively low across all of the studies, and in other reviews the authors achieved similar results [2, 15]. Two studies were published, after the Beijing 2008 Olympic Games and London 2012 Olympic Games, in which a low injury rate was indicated for fencing [5, 6]. Despite the low injury rate, as in any sport, injuries occur and are an integral part of the competition.

When comparing fencing to other combat sports, it has a relatively low injury rate. Combat sports typically involve two individual combatants fighting each other using specific techniques (striking, kicking, grappling, and weapons) and respecting a set of prearranged rules [16].

One of the studies examined demonstrates that injuries in combat sports are minor compared with injuries in team sports. These rates were between 4.1 and 4.5/1,000 hours. The location of the injury depended on the type of sport. Lower back, shoulder and knee injuries were most typical in judo, while in taekwondo these involved the fingers and thigh [17].

Another study compared various combat sports. Among all combat sports and martial arts, the most frequent injuries were noted as broken bones and damage to the knee ligaments. In kickboxing, the most frequent injury is a broken nose (60%), while the second most frequent injury is other broken bones (16%). These injuries were most likely to occur during training fights (79%); only 14% of injuries took place during competitive fights. In judo, the most frequent injuries are knee injuries, broken bones, sprains of the ankle joint, bruises, and cuts on the eyebrow ridge. 59% of injuries occurred during live competition. In karate, 22% of injuries were broken bones, 17% were knee injuries, and 10% were spinal injuries; 69% of injuries happened during a fight, however, a majority of these happened during competitions (56%). In the present study, fencing has been included among other combat sports and martial arts (total 17). In this group the most frequent injuries were damage to the knee ligaments (18%) and 46% injuries occurred during the competition [18]. The latest research by Witkowski et al. [19], shows that many 15-16 year old martial arts athletes sustained injuries during their career (n = 90 and 11 declared "no"), the most common: soft tissue bruises 39.8%; joint sprain (ankle, elbow, etc.) 26%; joint sprain (ankle, elbow, etc.) 10.4% and below ten percent: complete or partial tear of ligaments and tendons 8.2%; bone fracture 7.3%; head injury 5.2%; spine injury 3.1%.

However, when focusing on fencing the most common injuries in this review were comprised of ankle sprains and lower limb muscle strains. In another review, the findings also support the lower extremities as the most often injured site [2]. The footwork of the fencer's legs during

the fight is dynamic and consists of frequent changes to the direction of movement. Such rapid changes in footwork can be a cause for injury.

Fencing is divided into three competitions: épée, foil, and sabre. The results of these studies are not clear. In two studies, the largest number of injuries were suffered by fencers practicing the épée [11, 14]. However, in three studies, the highest rate of injury was in fencers training with the sabre [1, 3, 12]. There is a need for more prospective studies to collect data on injuries and the various associated risks.

The scientific literature on fencing is not particularly abundant. There is not a lot of research on the subject, and there is a distinct lack of research on the incidence of fencing injuries in different age groups and groups of different sports levels. In the analysed studies, the groups of fencers were not equal in terms of gender, age, and choice of weapon. The lack of consensus in the collection of injury data limits the development of a prevention program for fencers.

CONCLUSIONS

High-performance sport is often associated with injuries. Though fencing is a combat sport, the published studies revealed that the injury rate in fencing is low. The lower limb was the most common injury location involving any weapon, and there were no differences noted between men and women. The most frequent type of injuries were strains and sprains, which are typical of dynamic activities involving rapid change of direction movements. Although fencing has a low conducted in different age groups and among different levels of fencers, which can help to prevent injury and provide an impetus for necessary training modifications.

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