Injury epidemiology of the Spanish men's and women's field hockey league: a descriptive study

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Summary

Introduction: The aim of the present study is to describe injury patterns observed over the course of one season among athletes participating in the highest-level male and female field hockey competitions in Spain.
Material and methods: A total of 131 athletes were included in the study (67 men, with a mean age of 24.5 ± 4.2 years, and 64 women, with a mean age of 24.2 ± 3.8 years). A descriptive analysis was conducted on time-loss injuries (i.e., injuries that resulted in the athlete missing at least one training session or match), as recorded by the biomedical teams of each participating club.
Results: A total of 69 time-loss injuries were reported (34 in male players and 35 in female players), with muscle injuries being the most frequent (31 episodes, accounting for 44.9% of all reported injuries), particularly affecting the hamstring muscles. The average duration of time-loss was 35.8 ± 75.3 days. The injury incidence rate was 50.7 injuries per 100 athletes per season in senior men and 54.7 in senior women. Notably, four anterior cruciate ligament (ACL) injuries were recorded, corresponding to an incidence rate of 6.5 injuries per 100 athletes per season.
Despite the increasing clinical awareness of concussion in sports, no cases of this condition were reported throughout the entire season. Underdiagnosis should be considered a potential factor contributing to this lack of reporting.
Conclusions: This study provides an initial overview of injury patterns among elite-level Spanish field hockey players and should serve as a foundation for future research and injury prevention efforts, with particular attention to hamstring muscle injuries.

Key words:
Injuries. Field hockey. Epidemiology. Injury surveillance. Time-loss.

Epidemiología lesional en la liga española de hockey hierba masculina y femenina: un estudio descriptivo

Resumen

Introducción: El propósito del presente estudio es describir los patrones lesionales durante una temporada de los deportistas de la máxima competición masculina y femenina de hockey hierba en España.
Material y métodos: Se estudiaron 131 deportistas (67 hombres, con una media de edad de 24,5 ± 4,2 años y 64 mujeres, con una media de edad de 24,2 ± 3,8 años). Se realizó un estudio descriptivo de las lesiones con baja deportiva (el/la deportista no participa, como mínimo, en un entrenamiento o partido) recogidas por los equipos biomédicos de cada equipo.
Resultados: Se recogieron un total de 69 lesiones con baja deportiva (34 en jugadores masculinos y 35 en femeninas), de las cuales las más frecuentes las lesiones musculares (31 episodios, 44,9% de las lesiones totales), en especial de la musculatura isquiotibial. El tiempo de baja deportiva promedio fue de 35,8 ± 75,3 días.
La proporción de incidencia fue de 50,7 lesiones por cada 100 deportistas por temporada en sénior masculino y 54,7 en sénior femenino. Se registraron 4 lesiones de ligamento cruzado anterior, con una proporción de incidencia de 6,5 lesiones por 100 deportistas por temporada.
Pese a la relevancia clínica que se está evidenciando con la conmoción cerebral en el deporte, no se reportó ningún episodio de dicha patología durante toda la temporada. Debe considerarse el infradiagnóstico como motivo para la falta de reporte de conmociones cerebrales.
Conclusiones: El presente estudio describe las lesiones de jugadores/as de primer nivel de hockey hierba españoles y debe marcar un punto de partida para el estudio y prevención de las lesiones en este deporte, con especial énfasis a las lesiones musculares de la musculatura isquiotibial.

Palabras clave:
Lesiones. Hockey hierba. Epidemiología. Vigilancia de lesiones. Baja deportiva

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Introduction

Field hockey (FH) is a sport played in 132 countries worldwide and is one of the sports with the most officially registered players internationally, second only to football[1,2]. Spain is a world power in FH, both at club and national team levels, and it takes part in international competitions and the Olympic Games.

FH is a dynamic and complex team sport, played between two teams of 11 players (10 field players and one goalkeeper). It is considered a contact sport due to the frequent interaction between players, both teammates and opponents, and with the dynamic elements of the game (ball and stick). Certain factors differentiate FH from other sports, such as the positioning required to dribble the ball, the speed of the ball in shots and special situations like penalty corners.

The sport has undergone various changes in its regulations in recent years in order to increase player safety, such as changing the playing surface from natural grass to artificial turf, the mandatory protection now required when defending a penalty-corner and the obligatory use of shin pads and mouthguards[3].

Taking these factors into account, FH can be considered a sport with a high risk of musculoskeletal injury, which can influence athletes' performance and recovery.

As in other sports, lost-time injuries can affect the athletic performance and health of FH players[4], and the overall results of their teams[5,6]. Injury surveillance programmes allow for the analysis of injury patterns in a sport, establishing the magnitude of the problem, defining the first steps towards creating injury prevention programmes and identifying new problems to gain a deeper understanding of athletes' injury patterns[7,8]. The existence of epidemiological studies is especially relevant in sports where teams do not have a generalised sports injury surveillance system in their leagues because the scientific information provided can help the health professionals involved in these sports better understand the problems which need to be addressed.

The objective of this study is to describe the lost-time injury patterns in participants in the top Spanish division of FH over one season.

Materials and methods

Research design

A descriptive study was conducted with purposive non-probability sampling of eight teams from the top Spanish FH divisions (four teams from the senior men's first division [SM] and four teams from the senior women's first division [SW]. The study cohort consisted of 131 athletes: 67 male and 64 female.

The men's and women's first divisions in the 2023/24 season consisted of 12 teams each.

To be included in the study, the athletes had to meet the following criteria: they had to play for the senior team and be part of its original squad. Athletes from lower categories who only participated occasionally in training/matches were excluded.

All the athletes gave their consent for the collection of injury data because such monitoring was already part of the team's routine activities. The study was designed in accordance with the Declaration of Helsinki[9].

Data

The athletes' data and injury characteristics were recorded by each team's medical staff over the 2023/24 season, beginning on the first day of preseason and ending with the last match of the season. The number of official matches played during the season ranged from 35 to 45, depending on the team's performance.

Clinical information regarding the type of injury, injury mechanism and number of days lost was recorded on a pre-designed, standardised form, with the data pseudonymised to protect the privacy of the participants.

Injuries not related to FH and lost time for medical illnesses or other reasons were not recorded.

Definitions, categories and calculation of injury incidence

The injuries were classified according to version 10 of the Orchard Sports Injury Classification System (OSICS)[10]. The type of injury, location and onset were recorded in accordance with the International Olympic Committee consensus statement11. The concepts of lost-time injury (LTI) and return-to-play (RTP) times were based on the definitions suggested by the Union of European Football Associations (UEFA)[12,13].

The definitions used in the study are shown in Table 1.

Statistical analysis

A descriptive analysis of the LTIs was performed, calculating the absolute and relative frequencies in relation to the total number of injuries in each category of interest for the qualitative variables.

For the quantitative variables, summary measures of central tendency (mean) and statistical dispersion (standard deviation and range) were calculated.

Table 1. Definitions used in the study.

Concept	Definition
Lost-time injury (LTI)	Any physical complaint experienced by an athlete during training or a match that forces them to miss the next training session or match.
Return-to-play (RTP) time	The number of days from the day an athlete suffers an injury and cannot take part in their sport as a result until the day he or she can participate again in a match or full training session.
Recurrence	Any injury of the same type and in the same anatomical location as an injury suffered by the same individual in the two months following RTP.
Incidence proportion	Calculated according to the formula i = n/e, where n is the number of injuries during the study period and e is the number of exposed athletes. Expressed as injuries per 100 athletes per season.
Severity	Injury severity was classified according to RTP time as mild (1 to 7 days), moderate (8 to 28 days) or severe (>28 days).

We calculated the summary measures of the LTI incidence proportion using the formula $i = e/n$, where e is the number of events (injuries) during the study period and n is the respective number of exposed or participating athletes, with incidence proportions expressed as injuries per 100 players per season. The pois.exact function from R's epitools package was used to calculate the incidence proportions, estimating the incidence and 95% confidence intervals using a Poisson distribution. All the analyses were performed using SPSS v21 and the R environment (The R Foundation for Statistical Computing, Vienna, Austria), version 3.4.

Results

Characteristics of the athletes

The characteristics of the athletes in the sample are shown in Table 2.

Total injuries

A total of 69 lost-time injuries (LTIs) were recorded, 34 (49.3%) in SM and 35 (51.7%) in SW.

24 male players (35.8% of SM) and 21 female players (32.3% of SW) suffered at least one injury during the season. The mean number of LTIs per athlete per season was 0.52 (0.51 in SM and 0.55 in SW). 4 athletes suffered 3 LTIs (2 SM and 2 SW), 10 athletes suffered 2 LTIs (4 SM and 6 SW) and 33 athletes suffered 1 LTI (20 SM and 11 SW). 84 (64.1%) athletes did not suffer any injuries during the 2023/24 season.

Relative frequencies

The most frequent LTIs were muscle injuries, with 31 (44.9%) episodes, 14 in women and 17 in men. These muscle injuries exclusively affected thigh muscles, with 4 injuries to the adductor longus, 7 to the rectus femoris and 20 to the hamstrings. Sixteen (25%) joint injuries, 10 (15.6%) fractures and 9 (14%) tendon injuries were also recorded.

Most of the injuries affected the lower limbs (79.7%, n = 51), followed by the upper limbs (12.5%, n = 8), head and neck (4.7%, n = 3), and trunk (3.1%, n = 2). On the lower limbs, the most frequent location was the thigh, with 44 injuries, followed by the knee with 10 and the ankle with 8.

As for the injury mechanism, most of the injuries (n = 48, 69.7%) resulted from an indirect mechanism, while a direct mechanism was a less frequent cause (n = 21, 31.3%).

Table 2. Characteristics of the athletes in the sample.

	Men (n = 67)	Women (n = 64)
Age (years)	24.5 ± 4.2 (range 19-38)	24.3 ± 3.8 (range 18-34)
Height (cm)	178 ± 6 (range 167-191)	163.4 ± 4.9 (range 155-178)
Weight (kg)	73.8 ± 7.3 (range 60.5-94)	58.2 ± 6.7 (range 46.3-78.3)
BMI (weight/height^2)	23.1 ± 1.9 (range 18.5-30.7)	21.8 ± 2.1 (range 18.6-27.3)

Data obtained from pre-season medical examinations.
cm: centimetres; kg: kilograms; BMI: body mass index.

The location of the injuries categorised by gender is shown in Figure 1.

There were 4 episodes of recurrence. The recurrence proportion was 6.2% of all injuries.

Incidence proportion

Table 3 shows the LTI incidence proportion described in the study.

The overall injury incidence proportion was 52.6 (95% CI: 44.7–61.9) injuries per 100 athletes per season, being higher in women, 54.7 (95% CI: 43.7–68.3), than in men, 50.7 (95% CI: 40.1–64.2).

The muscle injury incidence proportion was 23.7 (95% CI: 17.4–32.1), being 25.4 (95% CI: 16.8–38.2) in men and 21.8 (95% CI: 13.8–34.7) in women.

Comparison of the overall injury incidence proportion and the muscle injury incidence proportion found no significant differences between male and female athletes.

Return-to-play time and severity

The RTP times for the injuries described were 35.8 ± 75.3 days (range: 2–366, mode: 7), 39.8 ± 87.2 days (range: 2–366, mode: 4) in women and 31.4 ± 61.2 days (range: 3–350, mode: 7) in men.

Classifying by severity, 21 injuries (30.45%) were considered mild (RTP time: 1–7 days), 35 (50.7%) were considered moderate (RTP time: 7–28 days) and 12 (17.4%) were considered severe (RTP time: >28 days).

Muscle injuries involved a mean RTP time of 18.3 ± 14.8 days (range 4–61, mode 4), with 9 classified as mild, 18 as moderate and 4 as severe.

Within the severity of the injury, we specifically differentiated those that required surgical intervention. These represented 7.8% of the injuries recorded (n = 5), with an incidence proportion of 3.8 (95% CI: 1.6-9). 4 anterior cruciate ligament (ACL) ruptures and 1 metacarpal fracture were recorded. Of the ACL injuries, three were in female athletes. The mean return-to-play (RTP) time for these operations was 323.2 days (range: 265–366 days).

Discussion

Despite being a highly popular sport in Spain, to date only two studies have analysed injuries in elite Spanish field hockey clubs[14,15].

Figure 1. Location of injuries in male (left) and female (right) players.

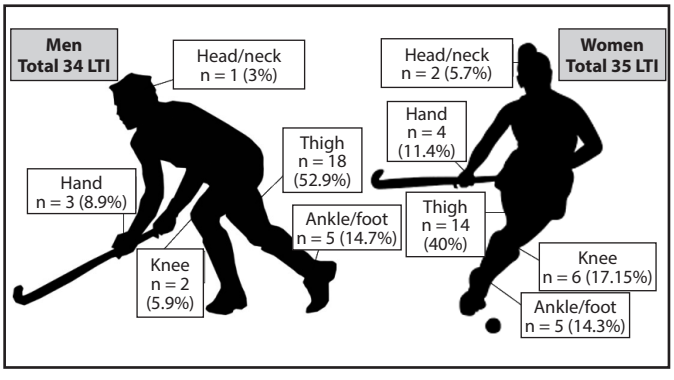

Table 3. Incidence proportion of the injuries described in field hockey players.

		Total N	Senior men's leagues players (n = 67)		Senior women's league players (n = 64)	
			N	Incidence proportion (95% CI)	N	Incidence proportion (95% CI)
Total injuries		69	34	50.7 (40.1-64.2)	35	54.7 (43.7-68.3)
Onset	Acute	44	23	34.3 (24.5-47.8)	21	32.8 (23.1-46.5)
	Gradual	25	11	16.4 (9.5-28.1)	14	21.8 (13.7-34.7)
Mechanism	Direct	21	8	11.9 (6.2-22.8)	13	20.3 (12.5-33)
	Indirect	48	26	38.8 (28.7-52.4)	22	34.3 (24.5-38.2)
Severity	Mild	21	9	13.4 (7.3-24.7)	12	18.7 (11.2-31.2)
	Moderate	35	19	28.3 (19.4-41.5)	16	25 (16.3-38.2)
	Severe	12	5	7.5 (3.2-17.3)	7	10.9 (5.4-22)
Type of injury	Muscular	31	17	25.4 (16.8-38.2)	14	21.8 (13.7-34.7)
	Hamstring	20	12	17.9 (10.7-29.9)	8	12.5 (6.5-23.9)
	Rectus femoris	7	2	10.4 (5.1-21.1)	5	7.8 (3.4-18.1)
	Adductor longus	4	3	4.4 (1.4-13.5)	1	1.5 (0.2-10.9)
	Tendinopathy	9	5	7.5 (3.2-17.3)	4	6.2 (2.4-16.1)
	Joint	16	5	7.5 (3.2-17.3)	11	17.2 (10-29.4)
	Fracture	10	5	7.5 (3.2-17.3)	5	7.8 (3.4-18.1)

Although international studies of this sport exist, the methods for collecting injury data, variability in the definition of injury (associated or not with time lost from sport), the small sample sizes and the profiles of the participants make it difficult to compare results and draw very generalisable conclusions[16]. The results obtained from this study should, therefore, contribute to defining injury patterns, specifically in elite Spanish FH players.

In this study, the incidence of injuries was 52.6 injuries/100 athletes per season (50.7 in SM and 54.7 in SW), with no significant differences in injury risk found by sex. This incidence coincides with that observed in previous FH studies, in which women presented slightly higher values than men[14]. The total number of injuries and the incidence of injuries per 100 athletes observed in male athletes is lower than in association football[17], basketball[18] and roller hockey[19]. The same trend is observed in female athletes[20–22].

Analysing the severity of the injuries observed in this study, we can state that the most prevalent type of injury in elite FH is moderate. This finding is similar to that of previous FH studies, which found that moderate injuries were the most frequent, accounting for 60% of the cases studied[15]. Knowing the incidence and severity of typical injuries in a sport is relevant because, as some studies affirm[23], it facilitates a better approach to the injury problem, allowing for the establishment of more specific prevention measures. Regarding severe injuries, the results of this study (17% of injuries) are consistent with previous studies of other cooperation-opposition sports played on a large field, such as association football (16.5%) or rugby union (22%)[24,25].

Regarding the most frequent anatomical location, the results obtained confirm the trend of previous studies, in which the lower limbs were the most frequently affected area, followed by the upper limbs, head and neck[2,15,26,27]. The dynamics of the game, the use of tools and the type of ball are doubtlessly among the most significant risk factors which explain the incidence in these areas.

As for muscle injuries, previous studies have analysed the incidence of hamstring injuries in different sports, including FH[28,29]. One study was published that analysed the incidence proportion in a single club over 10 seasons, with a result of 1.34 hamstring injuries/100 athletes/season, much lower than the result in this study (15.2 injuries/100 athletes/season)[29]. No previous study has analysed the incidence proportion of injuries in other muscle groups among FH players from different clubs. The results of this study confirm that the hamstrings are the muscle group which should be the focus of prevention efforts, followed by the rectus femoris and the adductors. It is worth noting that no injuries to the triceps surae were described, a more frequent area for injuries in sports such as association football, basketball or handball[17,30,31]. Hamstring injuries usually occur in situations involving marked hip flexion with the knee extended, common in actions such as running and specifically sprinting[32]. Based on our results and considering the dynamics of the game, it is likely that the injury mechanism is similar in FH. Although different studies have postulated that sex constitutes a non-modifiable risk factor for hamstring injuries[33], our study did not show significant differences between female and male athletes.

Since most of the injuries described in this study are muscular, the most frequently observed injury mechanism in the participants was indirect. These results coincide with other studies of FH[2] where direct trauma injuries are less frequent than in other sports, such as association football, with 30% of injuries produced in tackling[34], or rugby, where tackling is a central part of the game[35] and generates a greater number of injuries. Several articles have theorised that changes in FH protection

regulations in recent years, increasing protection, have decreased the incidence of trauma injuries[3].

Regarding the anterior cruciate ligament (ACL) injuries reported in this study, while their number is not alarming, the higher incidence in female FH players is consistent with previous literature in other sports. A number of studies warn that women are at greater risk of suffering this type of injury[36], making sex a risk factor which should be considered in prevention programmes. The finger is often pointed at anatomical factors, strength levels and hormonal matters as responsible for the increased likelihood of suffering this type of injury[37].

In the last decade, awareness of head injuries and their potential consequences for athletes has grown in sport[38,39].

Nevertheless, the present study did not report any concussion-related episodes resulting in time lost from sport during a full season across eight top-level teams. Although previous studies have shown that the incidence of concussion in field hockey is low, such a low incidence could be explained by underdiagnosis, as has been described in other sports and studies. Such underdiagnosis has consequences for both athletes and medical teams[38,40]. It is important that associations provide information and training to athletes, coaching staff, medical teams and even families in order to raise both alertness to head injuries and awareness of their potential long-term effects. It is vital that a proper sideline assessment be performed to avoid the long-term health consequences of concussion for athletes[42].

Conclusions

The results of this study describe, for the first time, the injury epidemiology of elite Spanish field hockey players, both male and female. The findings should provide a baseline for defining injury profiles in these athletes. This will allow healthcare professionals working with athletes in this sport to develop more specific and informed prevention programmes to reduce the impact of injuries on their health and athletic performance.

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Conflict of interest

The authors declare no conflict of interest.

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