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Original research

Acute injuries in Finnish junior floorball league players

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ABSTRACT

Objectives: To investigate the incidence and characteristics of acute time-loss injuries in Finnish junior floorball league players.
Design: Prospective cohort study with 3-year follow-up.
Methods: One hundred and eighty-six female and male players (mean age 16.6 ± 1.4) took part in the follow-up study (2011–2014). The training hours and games were recorded on a team diary. Floorball related acute injuries were registered and verified by a research physician. The injury incidence was expressed as the number of injuries per 1000 h of exposure. Incidence rate was calculated separately for games and practices, and for males and females.
Results: One hundred and forty-four acute time-loss injuries occurred. Injury incidence was 26.87 (95% CI 20.10–33.63) in junior league games, and 1.25 (95% CI 0.99–1.52) in team practices. Female players had significantly higher game injury rate (IRR 1.88, 1.12–3.19) and joint/ligament injury rate (IRR 1.70, 1.07–2.73) compared to males. Eighty-one percent of the injuries affected the lower limbs. The ankle (37%), knee (18%), and thigh (14%) were the most commonly injured body sites. More than half of injuries involved joint or ligaments (54%). Twenty-six percent of the injuries were severe causing more than 28 days absence from sports. Eight anterior cruciate ligament ruptures of the knee occurred among seven female players.
Conclusion: The study revealed that risk of ankle and knee ligament injuries is high in adolescent floorball, specifically among female players.

1. Introduction

Floorball is a fast-paced indoor team sport with growing popularity worldwide. The International Floorball Federation (IFF) was founded in 1986 by the national floorball associations of Finland, Sweden, and Switzerland. Today, the IFF has national member associations in 65 countries (personal communication/the IFF). Floorball is one of the most popular team sports in Finland. In 2016 the Finnish Floorball Association had over 850 registered clubs with 54 900 licensed players, of which the number of junior aged players was 28 900 (personal communication/the Finnish Floorball Association). Moreover, floorball is widely played in schools, workplaces and leisure time, and the overall number of Finnish floorball players is estimated to be approximately 350 000 (Finnish Floorball Federation, www.floorball.fi).

During the past couple of decades floorball has developed from a recreational activity into competitive sport that requires high degree of physical and motor performance abilities. The movement patterns of the field players comprise running in multiple planes of motion, sudden accelerations and decelerations, frequent changes of direction, and handling a stick and the ball during these fast-paced motions. Goalkeepers play mostly on their knees and they save the goal with their hands and body.

In spite of growing popularity, the number of studies on floorball injuries is low. Four prospective studies on epidemiology of floorball injuries have been previously performed among licensed players in Finland and Sweden.[1–4] These investigations have revealed that the most of the acute injuries affect the lower limb, and the ankle, knee and thigh are the most common sites of injuries.[1–4] One of the most severe sports injuries is a rupture of

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anterior cruciate ligament (ACL) of the knee which often leads to a long-term absence from sports and increases the risk for degenerative joint disease.[5–7] According to the previous studies, the risk of ACL injuries is high in floorball, especially among female players.[3–4]

Floorball has also been reported to belong to the highest risk group of sports concerning sports-related eye-injuries.[8–10] According to a Finnish study at the Ophthalmology Emergency Clinic in Helsinki, floorball caused 45% of all sports-related eye-injuries during a 6-months study period.[8] Correspondingly, in a Swedish study, 56% of sports-related eye-injuries in Jonköping county from 2008 through 2011 occurred in floorball.[9] A cross-sectional study in Sweden and Switzerland revealed that 28% out of 506 field players in adult series had suffered an injury to the eye or its vicinity at least once.[10] Protective eyewear for floorball has been available for a decade, but use of them is still relatively scarce. Since 2008 protective eyewear has been required in the Finnish junior series among players whose year of birth is 1999 or later, but for older players use of eye protection is not mandatory (personal communication/the Finnish Floorball Association).

The above noted previous studies on floorball injuries have focused on adult top level leagues whereas detailed information on injuries in junior floorball leagues is lacking. Nevertheless, knowledge on epidemiology of typical injuries in particular target groups is crucial for creating effective injury prevention methods. The purpose of the present study was to investigate the incidence and characteristics of acute floorball injuries in female and male junior league players.

2. Materials and methods

This study is a part of a large PROFITS-study (Predictors of Lower Extremity Injuries in Team Sports) carried out in Finland during 2011–2015. Detailed information of the PROFITS-study is described elsewhere.[11] The study was approved by the ethics committee of the Pirkanmaa Hospital District, Tampere, Finland (ETL code R10169), and was performed in accordance with the Declaration of Helsinki.

Eight adolescent floorball teams from three sports clubs from Tampere City district, Finland, were invited to participate in the investigation. The invited study cohort consisted of six male teams and two female teams from the two highest junior league levels. One male team declined to participate. Thus, seven teams were studied during the three consecutive years (2011–2014). Both female teams played in U20 league of 10 teams, three male teams played in U20 league of 12 teams, and two male teams played in U18 league of 12 teams. Teams entered the study either in May 2011, April/May 2012 or April/May 2013. Female teams completed all three follow-up years, two male teams completed two follow-up years, and the remaining three male teams completed one follow-up year. Final participation was based on an informed consent of each player (and parent/guardian if the player was <18 years of age).

Altogether, 193 players entered the study. We included junior players if they were official members of the participating junior teams and played in junior series during the follow-up. Seven players were excluded because they did not play in junior series. Consequently, 186 young floorball players (mean age 16.6 ± 1.4) were included in the study: 111 male and 75 female players. The cohort comprised 18 goalkeepers and 168 field players. Twenty-one female players and 10 male players played in both junior and adult leagues. The players ranged in age from 13 to 20 years during the follow-up. Eight of the players (7 females; 1 male) entered the study at age of 13–14 years. Of the participating players 112 completed one; 45 two; and 29 three follow-up years. Altogether, 289 athlete-years were followed in the study.

The players completed a questionnaire about background information[11] at the study onset. The questionnaire included questions about age, sex, starting age, playing position, playing level, and previous injuries. During the follow-up team coaches recorded player participation in team events on a team diary and noted all injured players. An injury was defined as any acute injury occurring during a junior game or practice making the player unable to participate in floorball training or playing during the following 24 h. All injured players were entitled to free appointment with a physician specialized to sports medicine (J.P., P.K.) at the Medical Center of the UKK Institute.

A research physician (J.H.) contacted the team coaches weekly to check new injuries. For any time-loss injury occurring during team practices or games, the physician contacted the injured player by phone and interviewed her/him using a structured form[3,11,12] to obtain detailed data and description of the injury. The location, type, place and time of occurrence, injury circumstances and mechanism, treatment and diagnosis, time loss from sports, and whether the injury was a first-time or a recurrent injury were registered. The injury mechanisms were reported as contact (direct contact to the injured body region), indirect contact (contact with other body parts) or non-contact.[13]

An injury of same site and same type as a prior injury that occurred after a player's full return in floorball from a prior injury was defined as a recurrent injury.[14] The recurrence of injuries was classified as early recurrence (a recurrent injury that occurred within 2 months of a player's full return); late recurrence (a recurrent injury occurred within 2–12 months after a player's full return); and delayed recurrence (a recurrent injury occurred more than 12 months after a player's full return). Contusions and lacerations were always classified as a first-time injury, whether they were recurring or first-time injuries. The severity of injuries was defined in four categories: minimal injury (an injury causing absence of 1–3 days); mild injury (4–7 days); moderate injury (8–28 days); and severe injury (>28 days).[14]

The exposure time on team practices were collected individually for each player. The coach registered players' attendance at each team event, as well as duration of training session and type of training (floorball training; strength/conditioning/warm-up and cool-down exercises). Individual practices performed outside the scheduled team events were not included in the exposure data. The time of exposure to floorball games was calculated for entire teams. The total number of games played by each junior team was collected. Then the exposure time was calculated as follows: each game lasts 60 min of actual play and there are always six players on the court (a goalkeeper and five field players) resulting in total exposure of 6 h per game per team.

Data were analyzed using SPSS Statistics Software, version 22 (SPSS, Chicago, Illinois) and OpenEpi (Version 3.01).[15] Means with SD and medians with range were used to describe continuous data and frequency tables were used for categorical variables. The injury incidence was expressed as the number of injuries per 1000 h of exposure. Incidence rate was calculated separately for games and practices, and for males and females. The Mid-P Exact test was used to compare incidence rates between subgroups. Injury incidences and incidence rate ratios (IRR) were expressed with 95% confidence interval (CI). A p value <0.05 was considered significant. Benjamini–Hochberg adjustments for p values were calculated to control false discovery rate arising from multiple comparisons problem. Critical value for a false discovery rate was set to 0.25.

3. Results

The baseline characteristics of the subjects, as well as exposure hours and number of injuries during the follow-up are presented in

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