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Original article

Injuries in Spanish female soccer players

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Background: Epidemiologic research to learn the incidence, type, location, and severity of female soccer injuries and the risk factors for sustaining a sport injury is the first step in developing preventive policies. The aim of this study was to analyze the incidence of injuries in the population of female soccer players in Spain.

Methods: The injuries incurred by 25,397 female soccer players were registered by the medical staff of the Spanish Football Federation during 1 season. A standardized medical questionnaire was used to classify the injury according to type, severity, location, and injury mechanism. A total of 2108 injuries was reported with an incidence of 0.083 injuries per player per season. Most injuries were in the lower limbs (73.4%), mainly affecting knee (30.4%) and ankle joints (17.9%).

Results: The proportion of injuries derived from contact with another player was higher during matches (36.9%) than during training (11.4%; $p < 0.001$). Noncontact injuries were classified as severe more frequently than were contact injuries (51.0% vs. 42.6%; $p < 0.001$). A higher incidence of injury was found in adult soccer players (≥ 18 years) vs. their counterparts younger than 18 years (0.093 vs. 0.073 injuries per player per year, respectively; $p < 0.001$). There were no differences between age groups in any other injury variable (e.g., type, mechanism, location, or severity; $p > 0.05$).

Conclusion: Most female soccer injuries were located at the knee and ankle; the injury mechanism determined the playing time lost; and the player's age did not affect injury characteristics.

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Keywords: Ankle; Epidemiology; Football; Knee; Sport injuries; Women

1. Introduction

The popularity of soccer among girls and women in all parts of the world is on the increase. It is played officially in more than 100 countries, and the total number of female players worldwide can be estimated at around 30 million.¹ Epidemiologic injury studies in female soccer players have shown that 51%–83% of injuries occur through physical contact with an adversary,^{2,3} and 19%–39% are due to foul play.^{3,4} Injury studies have shown that 48%–70% of elite female soccer players sustain approximately 1 injury during the season,^{4,5} although the rate of injury is affected by factors such as age and competitive level.^{4,6–9} The rate of injury during training has been shown to range from 1.0–4.6 per 1000 hours of exposure.^{6,7}

Like male players,^{10,11} female soccer players are at a greater risk of sustaining injury in match play compared with training situations, with reported rates varying from 6.1–24.0 per 1000 hours of exposure in competition.^{4,6–8}

Regarding the time necessary for full recovery after an injury, previous research showed that about 44% of female soccer injuries were classified as slight (<1 week of time lost), 40% were classified as moderate (1–3 weeks lost), and 16% were severe (>3 weeks lost), depending on the research methodology.^{4–6,12–14} Interestingly, 69%–90% of female soccer injuries were classified as traumatic (sudden-onset injury, from a single incident with a known trauma),^{2,4–6,14,15} and most injuries were located in the lower extremities. Knees, ankles, and thighs have been shown to be the most common locations for injury in female players,^{4–6,16} although the knee has typically been referred to as the most frequent location for severe injuries.^{4–6} The most frequently diagnosed injuries were sprains and strains, with ankle sprains having the highest prevalence in both young^{6,13,15} and elite female soccer players.^{5,14}

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Epidemiologic research is the first step in developing preventive policies; it ascertains the incidence, type, location, and severity of female soccer injuries and the risk factors for sustaining a sport injury.^{17,18} Previous injury research has been carried out on elite adult female players^{4,5,14,19} or focused on young players,^{2,6,7,13,15,16} studying 1 or several women's soccer teams during 1 season. Thus, these investigations have included a limited number of participants, and the effects of factors such as age, performance level, and injury rate are inferred by comparisons among investigations. A global analysis that includes all the female soccer players in a federation competing in 1 country is still unexplored, although an investigation of these characteristics has been recently carried out for male players.¹⁰ The aim of this study was to analyze the incidence of injuries in the population of female soccer players in Spain by including all the female soccer players registered in the Spanish National Football Federation.

2. Materials and methods

2.1. Ethics statement

The study was revised by the Research Ethics Committee of the Camilo José Cela University in accordance with the latest version of the Declaration of Helsinki. The Research Ethics Committee indicated that this investigation did not require approval for bioethics considerations, and it approved the study design and methodology used in this experiment.

2.2. Participants

A retrospective cohort study of Spanish female soccer players was carried out during the 2010–2011 season (from September, 2010, until June, 2011), including the preseason and the competitive period. The study sample was composed of 25,397 female soccer players, 12,857 adults (≥ 18 years) and 12,540 under 18 years (U-18), licensed by the Royal Spanish Football Federation (RSFF) and playing in official domestic leagues. The study sample was obtained from 4 adult categories (2 national and 2 regional) and 6 age group categories (with only 1 regional category).

2.3. Procedures

All the female soccer players licensed by the RSFF were registered with the RSFF mutual benefit society, a unique nationwide insurance system. The mutual benefit society provides free medical support for soccer players who suffer from any physical complaint derived from soccer practice. When players are officially registered with the RSFF, they implicitly accept the injury insurance policy and agree to the recording of these injuries. As a result, all acute injuries that occur during training activities or during competition are reported and collected in the injury registry of the RSFF mutual benefit society. This investigation included all the injuries reported to the medical services of the mutual benefit society during 1 season. A medical practitioner specializing in soccer injuries recorded injury data on a paper player-injury audit questionnaire. Medical doctors were previously instructed how to correctly fill out the questionnaire and to report all the injuries that they

attended to during 1 season. The questionnaire was completed when a soccer player required the attention of a doctor, and the results were sent to the head of medical services at the RSFF. Doctors were made aware that a recordable injury was defined as “any physical complaint sustained by a player that resulted from a soccer match or training session, irrespective of the medical attention or time loss from soccer activities.” The questionnaire was based on the FIFA Medical Assessment and Research Centre consensus statement²⁰ and included the soccer player's age and several computable items, as follows.

(1) Injury conditions

The physician specified whether the injury was sustained during a match or during training and whether it was produced by a collision with another player (defined as contact injury) or not (defined as noncontact injury).

(2) Injury severity

The severity of the soccer injury was classified by the number of days that elapsed from the date of the injury to the date of the players' return to full participation in their soccer teams. Injuries were grouped as slight (< 7 days), mild (7–14 days), moderate (15–21 days), or severe (> 21 days).

(3) Injury classification

The soccer injuries were classified using an adapted version of the Orchard Sports Injury Classification.²¹ The questionnaire included specific items to identify the location on the body (including side) and the type of injury.

(4) Statistical analyses

All the information on the questionnaires was included in a database and associated software (Hardware and Programming SA, Madrid, Spain), which allowed cross-tabulation of the items specified. Standard statistical methods were used to calculate absolute and relative frequencies. The χ^2 test was performed to establish the significance of the difference between female players who suffered contact injuries and those who suffered noncontact injuries of any specific type, location, or severity. Two groups were then established by age (under 18 and adult female players) to determine the effect of this variable on the characteristics of female soccer injuries. All the statistical procedures were performed with Excel 2013 for Windows (Microsoft, Redmond, Washington, USA). The criterion for statistical significance was set at $p < 0.05$.

3. Results

Over the entire 2010–2011 season, the medical services of the RSFF treated 2108 injuries in the 25,397 female players (12,857 adults and 12,540 under 18) with an overall incidence of 0.083 injuries per soccer player per year. There was a lower rate of injury in U-18 players than in their adult counterparts (0.073 for U-18 players vs. 0.093 for adult players; $p < 0.001$). Of the total number of injuries reported in 1 year, 964 (45.7%) occurred during training practice, 1135 (53.9%) occurred during matches, and 9 (0.4%) were categorized as undefined (e.g., sustained while traveling to soccer competitions). The

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