Sports injuries in girls’ basketball

Carlos Ayán Pérez, Pedro Vicente Vila, Miguel Adriano Sánchez Lastra, Rocío Carballo Afonso, Silvia Varela Martínez, Joaquín Lago Ballesteros, José M.ª Cancela Carral


Introduction: basketball is a popular sport among preadolescent girls, although little is known about the incidence of injuries associated with the practice of the sport in this population. The aim of our study was to contribute information on the pattern of injury found in preadolescent girls who play federated basketball in Spain.

Materials and methods: during the Spanish Girls’ Basketball Championship of 2014, we collected data on certain individual sports-related characteristics of the players and the clubs, as well as on training characteristics and injury patterns, through personal interviews with coaches and administration of a questionnaire to the players.

Results: we collected data for 348 female players. Injuries in the past season were reported by 73.8%, most incurred during practice. Sprains were the most frequent type of injury, and the lower extremities the most frequent site; injury recurrence occurred in 30%. The rate of injury was 5.85 injuries per 1000 hours of play, and the court’s surface was the sole factor significantly associated with the risk of injury. The time losses due to injuries amounted to 2.54 ± 0.97 days, and 25% of players reported missing school activities.

Conclusions: the practice of basketball in girls aged 12 and 13 years carries a risk of injury that cannot be ignored, due to both the number of recorded injuries and to their potential impact on academic performance.

Lesiones deportivas en baloncesto infantil femenino

Introducción: el baloncesto es un deporte que presenta una gran aceptación entre las niñas preadolescentes, si bien poco se sabe sobre la incidencia de lesiones que su práctica tiene sobre esta población. Este trabajo tuvo como objetivo aportar información sobre el patrón de lesión deportiva encontrado en niñas preadolescentes practicantes de baloncesto a nivel federado en España.

Material y métodos: durante el Campeonato de España de baloncesto infantil femenino de 2014, se recogió información acerca de ciertas características deportivas individuales de las jugadoras y del club, así como de los entrenamientos y del patrón lesivo, mediante entrevistas personales a los entrenadores y cuestionarios a las jugadoras.

Resultados: se recogió información de 348 jugadoras. Un 73.8% reconoció haberse lesionado en la última temporada, con un 30% de recidivas. El índice lesivo fue de 5,85 lesiones por cada 1000 horas de práctica, y la superficie de juego fue el único factor que mostró tener influencia sobre el riesgo de lesión. La ausencia por parte del 25% de las jugadoras fue variable.

Conclusiones: la práctica de baloncesto por parte de niñas de entre 12 y 13 años presenta un riesgo de lesión que no debe pasar desapercibido, tanto por el promedio de lesiones registrado, como por la posibilidad de que existan recidivas y que la lesión acarree consecuencias a nivel académico.
INTRODUCTION

Physical inactivity at early ages is considered a risk factor in relation to future adult health.\(^1\) Therefore, one of the main areas in which strategies need to be developed in children is the promotion of physical activity, as there is evidence that physically active children are less likely to become sedentary adults.\(^2\) In this context, promoting the practice of sports as a means to develop an active lifestyle in early ages is of great interest, especially in girls, who are less likely to persevere in sports and tend to stop practicing them before boys do, which makes them a target population.\(^3\) In Spain, one of the sports that is most attractive to girls in basketball,\(^4\) so its practice could help promote healthy habits in this subset of the population. However, the practice of basketball is associated with a high incidence of injuries in the paediatric population,\(^5,6\) with evidence that injuries from basketball are more frequent in girls compared to boys.\(^7\) In spite of this, little research has been conducted on the epidemiology of sports injuries in young female basketball players, especially in Spain.

Under these circumstances, and taking into account that the risks associated with the practice of sports at young ages must be known in order to develop preventive strategies that favour adherence to sports,\(^8\) further research seems necessary. Thus, the aim of our study was to contribute information on the pattern of sports injuries found in pre-adolescent girls who play federated basketball in Spain.

MATERIALS AND METHODS

Participants

We conducted a cross-sectional retrospective study in the framework of the Spanish Girls’ Basketball Championship held in 2014. We invited all girls who competed with their respective clubs and had been playing federated basketball consistently for at least 2 years to participate in the study. We informed the players of the aims of the study, and requested their written informed consent and that of their parents or, where absent, their coach. The study adhered to the principles of the Declaration of Helsinki\(^9\) and to the guidelines on good clinical practice for trials of the European Community (111/3976/88 of July 1990), as well as Spanish law on clinical research in human subjects (Royal Decree 561/1993 on clinical trials).

Procedure

We approached every coach of each participating club individually during the opening ceremony of the championship to inform them of the objective and characteristics of the study and request their participation. Once we knew which clubs were willing to collaborate with the study, we set up meetings in each team’s hotel at times chosen by their respective coaches. We collected the data in the conference rooms of these hotels, in the presence of the coaches and parents of the players, always with the authorization of the organisers of the championship.

Assessment

We held personal interviews with each coach to collect data regarding sociodemographic and anthropometric characteristics of the players, sport-related variables (hand preference, playing position), training variables (presence of fitness coach in club, mean number of fitness training sessions conducted during the season and type of flooring where teams held their regular practices) and the number of years that the players had been practicing federated basketball. The coaches also provided information on specific indicators regarding training loads, such as the amount of time spent training and the number of games played prior to participation in the children’s category of the Spanish championship.

The players that attended the meetings were asked to complete an ad hoc questionnaire designed and structured with the purpose of collecting data on their sports injury pattern. To this end, we explained to them that sports injury referred to
any accident or physical impairment occurring during a practice or game that required the player to be inactive (inability to participate in practices or games) for at least one day. The questionnaire included questions on: 1) the number of injuries sustained during the regular season in which players participated to gain access to the national championship; 2) type of injury sustained (sprain, luxation, concussion, etc.) and anatomical site of injury; 3) timing of injury (practice or game), setting of injury (home/away), type of playing surface regularly used for practice/competition, previous history of injuries and injury recurrence, and 4) number of days the player was inactive due to injury and impact of injuries on school life (missed classes/educational activities and perceived impact on academic performance).

The data were collected by three graduates in physical activity and sports science, who interviewed the coaches and administered the questionnaire to the players. They were present during the administration of the questionnaire to explain its characteristics and answer any questions that may arise to ensure they were completed correctly.

Statistical analysis

We used measures of central tendency to analyse the data on the anatomical site, type and severity of injuries, the associated risk factors and the impact of injuries in everyday school life activities in the sample under study. Subsequently, we calculated the risk of injury relative to the duration of exposure as the number of injuries per 1000 hours played, known as the rate of injury (RI), multiplying the number of weekly practices of each team by the mean duration of practices and adding the duration of the games played during the period under study, assuming that 10 players were participating simultaneously in practice sessions and 5 players during games. Once we had thus calculated the hours played, we divided the total number of injuries by the total number of hours of exposure and then multiplied the result by 1000.10 We used Pearson’s χ² test to explore the association between the rate of injury and the risk factors under study. We processed the data with the statistical software IBM® SPSS® 20.0 for Windows®, and defined statistical significance as p ≤ 0.05.

RESULTS

Of the 32 teams registered in the championship, 29 (90.6%) agreed to participate in the study. We surveyed a total of 348 players (age: 13.4 ± 0.53 years; height: 1.67 ± 7.83 metres; weight: 55.39 ± 8.97 kilograms; 82.4% right-handed) who had played federated basket for a mean of 6.4 ± 2.08 years and had been in their current club for a mean of 2.64 ± 1.38 years. The relative distribution of players according to their playing positions was forward (43.6%), point guard (24.9%) and centre (22.3%), with a very small percentage or players without a specific position (9.2%).

When it came to training loading, the data provided by the coaches showed a mean frequency of practices of 3.25 ± 1.05 days/week, with a mean duration per session of 100.25 ± 30.24 minutes. A total of 22 coaches reported having a fitness coach available during the season. Also, 56.9% reported that the type of flooring used most frequently in practices and games was hardwood or synthetic rubber, compared to the remaining 43.1%, who reported polished concrete or other types of flooring (43.1%) as the usual playing surface.

Of all surveyed players, 257 (73.8%) reported having been injured as a result of playing basketball in the 2013-2014 season. There was a higher proportion of injuries incurred during practices (58.9%). When we analysed the injuries incurred during games (34.8%), we found that 62.8% occurred when the player was playing at home.

A total of 385 injuries were reported, amounting to an average of 1.10 injuries per player per season. The descriptive analysis showed that sprains were the most frequent type of injury (42.2% of cases), followed by muscle, tendon and bone injuries (24.7, 12.2 and 10.2% of cases, respectively) (Figure 1). The lower extremities were the most frequently involved anatomical site (72.3% of cases), followed...
by the arms, the trunk and the head (18.3, 8.3 and 1.1% of cases, respectively) (Table 1).

Of the players that reported injuries, 42.5% had a single injury, 24.7% two injuries and the remaining 32.8% more than two injuries. Of the players that had more than one injury, 30.5% had the same injury more than once (recurrence).

Our calculation of the RI showed that there were 5.85 injuries per 1000 hours of playing. The bivariate analyses did not find a significant association between the occurrence of injuries and any of the risk factors under study, except for the playing surface, with a lower RI in players practicing basketball on synthetic rubber or hardwood floors ($P < .001$).

The amount of time that players were unable to participate in practices or games due to injury was 2.54 ± 0.97 days. The surveyed players did not believe that the sports injuries resulting from playing basketball had any significant impact on their academic performance. However, 27.3% acknowledged that they had needed to miss academic activities after getting injured.

**Figure 1. Number of injuries by type and nature of injury**

**Table 1. Injuries in girls basketball by anatomic site**

<table>
<thead>
<tr>
<th>Body part</th>
<th>Number of injuries</th>
<th>Percentage of total injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper extremity</td>
<td>51</td>
<td>18.2%</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>201</td>
<td>71%</td>
</tr>
<tr>
<td>Head/face</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Trunk</td>
<td>23</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The aim of this study was to contribute information on the pattern of sports injury found in girls who play federated basketball in the children’s category. Since the risk factors associated with sports injuries vary with specific aspects such as age, sex and type of sport, and considering the scarcity of data on the pattern of injury in girls who play basketball, especially in Spain, the findings of this study can be considered relevant. Thus, the information we present here may be useful to those healthcare professionals whose responsibilities include the promotion or prescription of physical activity in this population, and to sports professionals who wish to design injury-prevention strategies based on practical evidence.

Basketball is a sport associated with a high incidence of injuries, even when it is practiced by children or adolescents. In this study, we found that nearly three fourths of the surveyed players had at least 1 injury during the season under study, which corroborates this association.

When it came to the most common injuries, sprains were most frequently reported, followed by muscle, tendon and bone injuries. These findings are consistent with those of other authors, who have found that sprains are the most frequent type of injury associated with the practice of
basketball, especially in the lower extremities. However, we did not find a high incidence of injury in the upper extremities or of strains in the ligaments of the toes, which have been commonly found in children who practice basketball of similar ages to those of our participants.  

Recurrent injuries are among the most important problems associated with the practice of sports on account of the impact they have on the health of young athletes. Based on the data collected in our study, nearly one third of players who had more than 1 injury had the same injury a second time. This proportion is significantly higher than those reported by other authors in male and female basketball players aged 16 to 30 years. In this regard, it is known that prior injury is a risk factor for having the same injury again, usually due to a lack of adequate recovery and prevention in the affected areas and those most susceptible to overuse, which is also directly associated with higher training volumes. Thus, it seems that strategies to prevent sports injuries need to be developed, targeting children from an early age, at least when it comes to girls’ basketball.

The high percentage of injuries mentioned above corresponded to an elevated RI, which values similar to those reported in other studies. Thus, in a study of ball games in children and adolescents, Yde and Nielsen found a RI of 5.7 injuries per 1000 hours of basketball play during games, with a lower RI of 2.4 during practices. They did not stratify the data by sex. In this regard, Barber, Myer and Hewett found a lower RI (4.2 for games and 2.4 for practices) in a sample of 162 girls aged 11 to 14 years. However, other authors have reported much higher RIs (8.8), which could have been due to the latter study covering a period of 20 years starting in 1988, thus including players whose experience in sports involved training methods and forms of competition developed when there was less scientific evidence on injury prevention. At any rate, it seems clear that the common thread in all these studies is that basketball is a sport with a substantial RI when practiced by preadolescent girls. Thus, the category analysed in our study (children’s: 12-13 years) may have been a key factor, as some authors have found that the number of injuries incurred by female basketball players peaks at age 13 years. One of the known risk factors for injury during basketball is the playing surface, of which we found evidence in our study. A possible explanation could involve the characteristics and physical properties of the flooring itself. Thus, synthetic rubber and hardwood floors have a lower coefficient of restitution compared to other types of flooring, which helps absorb and dissipate the energy generated by the impact of players landing on the floor. At present, one of the aspects that is attracting the most interest in the field of injury epidemiology is the time loss that results from sports injuries. This is due to the economic burden of, on one hand, treatment costs, and on the other the losses on the investment made by clubs in recruiting specific players. In this regard, we did not find studies in the literature referring to the days lost due to injury associated with the practice of basketball in lower categories, which in a way made our research original. The statistical analysis found that injured girls could lose an average of 2.5 days of sports practice, below the 6.98 days reported by Meeuwisse, Sellmer and Hagel in 142 male college basketball players. Along these lines, it seems equally interesting to assess the potential impact of injuries on academic performance, that is, the resulting hours or days lost in school attendance or impairment in academic performance. While three fourths of our respondents did not think that their injuries had an impact on their academic performance, the fact that 25% of them reported needing to temporarily discontinue academic activities due to their injuries is an aspect that must be taken into account. Injury prevention, especially in school-aged children, should not be solely aimed at maintaining or improving athletic performance, but also prioritize the protection of health and academic performance.

Despite the novelty of our study, we need to underscore that the data in which it is based were
collected by means of a recall questionnaire, which carries a risk of bias that cannot be ignored, as it impacts the quality of the obtained information. Thus, it is important to take into account that the interpretation of the results of this study is limited by the lack of a high-quality record of the factors associated with injuries kept by the teams themselves, and also our lack of access to health records documenting the injuries reported by the players who participated in our survey. Therefore, further studies are required to overcome these methodological limitations and confirm our findings.

CONCLUSIONS

The results of our study suggest that the practice of basketball in girls aged 12 and 13 years carries a risk of injury that should not be ignored, due to both the number of injuries documented and to the potential for recurrence and negative repercussions in academic performance. Although these results do not challenge the importance of promoting the practice of this sport at early ages, they do evince the need to develop preventive strategies with the end of reducing the risk of injury associated with it.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare in relation with the preparation and publication of this article.

ABBREVIATIONS

RI: rate of injury.

REFERENCES


