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INJURY INCIDENCE IN SOCCER

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Abstract. Soccer is the most universally popular and the most widespread sport, which also means being one of the most II team sports. Injuries negatively affect the performance of the athlete and the team. The objective of this study was to know the injuries produced throughout the 2016/2017 of the Spanish first and second division depending on the type of injury, position of the player, the minute in which the injury happened, and the age of the player.
It is a descriptive study in which the sample was made up of the players of the 42 teams of the Santander League and Liga 123 of Spanish soccer. The most common injuries have been muscle injuries (>50%), increasing in Liga 123 up to 75% of the II. The athletes who suffered the most injuries were the defenders (>40%), while goalkeepers recorded the lowest II (<4%). This fact may be due to the shorter distance run at normal intensity and the distance run at high intensity. Athletes between the age of 21 and 29 suffered a higher number of injuries (>35%) and besides, they happened in large part during the second half of the game.

Keywords: soccer, injury, epidemiology.

INCIDENCIA LESIONAL EN EL FÚTBOL

Resumen. El fútbol es el deporte universalmente más popular y el más extendido, lo que implica, además, ser uno de los deportes de equipo con mayor IL. Las lesiones afectan de manera negativa al rendimiento del deportista y del equipo. El objetivo de este estudio fue conocer las lesiones producidas a lo largo de la temporada 2016/2017 de la primera y segunda división española en función del tipo de lesión, posición del jugador, minuto en que se produce la lesión y la edad del jugador. Se trata de un estudio descriptivo, en el cual la muestra fue conformada por los jugadores de los 42 equipos de la Liga Santander y la Liga 123 del fútbol español. Las lesiones más comunes han sido las lesiones musculares (>50%), aumentando en la Liga 123 hasta el 75% de la incidencia. Los deportistas que más lesiones sufrieron fueron los defensas (>40%) mientras que los porteros registraron el menor IL (<4%). Este hecho se puede deber a la menor distancia

recorrida tanto a una intensidad normal como a la distancia recorrida a alta intensidad. Los deportistas comprendidos entre los 21 y los 29 años padecieron un mayor número de lesiones (>35%) y, además, ocurrieron en gran parte durante la segunda mitad del partido.

Palabras clave: fútbol, lesión, epidemiología.

Introduction

Soccer is universally the most popular and widespread sport in the world (Luthje et al., 1996; Inklaar, 1994). Soccer (association soccer) is a team sport that incorporates frequent fluctuations between high and low exercise intensities. These unpredictable changes may be accompanied by unorthodox movement patterns and the performance of specific skills that players do not perform in their daily lives (Barry, Atkinson, & Reilly, 2007). These unpredictable changes in game situations cause this sport to have a higher injury rate than other team sports, as seen in (Pascual, Pérez, and Calvo, 2008).

Injuries can negatively affect team performance. It could be observed in the Qatari soccer first division that clubs with a lower incidence of injuries showed a strong correlation with a better league position, higher number of wins, more goals scored as well as a better goal difference and total points (Eirale, Tol, Farooq, Smiley, and Chalabi, 2013). In addition, lower injury burden and higher match availability were associated with an increase in UEFA SCC (coefficient representing a team's performance in European competitions) as shown in Hägglund et al. (2013). There are several definitions of what an injury is in the literature. As stated by Eirale et al. (2017), the most commonly used definition in the elite soccer literature is the definition of "missed or missed time" injury, implying that the injury forces the athlete to miss at least one future training session or the next match. Its main limitation is that players can sometimes continue activity despite an injury. In addition, key players, those who play the most minutes throughout the season, may be forced to play and train despite an injury due to their impact on the team as seen in the study by Eirale et al. (2017).

The injury incidence (II) of professional soccer in training is estimated to be between 1.5-7.6 per 1000 hours of exposure, while II in competition is between 12-35 per 1000 hours of practice (Dvorak and Junge, 2000). Other studies, such as those by Ekstand, Waldén, and Hägglund (2004), and Ekstand, Hägglund, and Waldén (2011), show that II during competition is 5-10 times higher than injury II during training. The bulk of similar research places competition injuries at around 25-28 per 1000 hours of exposure (Noya Salces & Sillero Quintana, 2012). Muscle injuries are one of the main problems for soccer players, occupying 20-37% of all injuries at the male professional level and 18-23% at the male amateur level (Ekstrand, Martin, and Wallden, 2011).

The aim of this study is to know the injuries produced throughout the 2016/2017 season of the Spanish first and second division according to the type of injury (muscular type or not); position of the player (goalkeeper, defender, midfielder, and striker); minute in which the injury occurs (0-15, 15-30, 30-45, 45-60,60-75, and 75-90) and the age of the player (<=20, 21-25, 26-29, 30-32, >=33). Only injuries occurring in match situations were recorded. Finally, it should be noted that our hypotheses are as follows: the most abundant injuries are muscular, forwards are the most injured players, the last 15 minutes of each half are the most favorable for injuries to appear, and older players are more

injured than younger players.

Method

This is a descriptive study, in which our sample is made up of the players of the 42 teams of the Liga Santander and Liga 123 of Spanish soccer during the 2016/2017 season. These data have been collected from the different official websites of the soccer teams and other websites, such as transfermarkt or resultados-fútbol, which compile great information of interest for our study. The independent variable of our study is injuries, while the dependent variables are the type of injury, the age and position of the injured player, and the minute in which the injury occurs.

Results

The sample amounted to a total of 1,222 players spread across the 42 teams, 20 from the First and 22 from the Second during the 2016-2017 season.

As for the type of injury, the total number of injuries in the First Division was 179, of which 95 were muscular (53.1%), while in the Second Division the total number of injuries was 170, of which 129 were muscular (75.5%).

Table 1
Number of injuries by position in First Division

	N = 179			
	Goalkeeper	Defense	Midfielder	Forward
No. Injuries (%)	7 (3,91%)	87 (48,6%)	47 (26,25%)	38 (21,22%)

Table 2
Number of injuries by position in the Second Division

	N = 170			
	Goalkeeper	Defense	Midfielder	Forward
No. Injuries (%)	4 (2,35%)	70 (41,1%)	48 (28,3%)	48 (28,3%)

With respect to the injuries recorded by specific position in the First Division, it was observed that defenders (87 injuries; 48.6%) are the players who are injured the most, while goalkeepers, on the other hand, are the ones who were injured the least (7 injuries; 3.91%).
In the Second Division and as in the First Division, defenders are the players who were injured the most (70 injuries; 41.1%) and goalkeepers the least (4 injuries; 2.35%).

Table 3
Number of injuries according to age range in the First Division

	N = 592				
	≤ 20 years	21-25 years old	26-29 years old	30-32 years	≥ 33 years
No. Players (%)	70 (11,82%)	225 (28%)	175 (29,56%)	87 (14,67%)	35 (5,91%)
No. Injuries (%)	4 (2,23%)	68 (37,99%)	70 (39,11%)	27 (15,08%)	10 (5,59%)

Table 4
Number of injuries by age range in the second division

	N = 592				
	≤ 20 years	21-25 years old	26-29 years old	30-32 years	≥ 33 years
No. Players (%)	66 (10,48%)	254 (40,32%)	147 (23,33%)	90 (14,29%)	73 (11,59%)
No. Injuries (%)	5 (2,94%)	61 (35,88%)	47 (27,65%)	35 (20,59%)	22 (12,94%)

The third variable analyzed total injuries as a function of the age of the athlete. They were grouped into <= 20 years, 21-25 years, 26-29 years, 30-32 years, >=33 years. In the first division, there were a total of 592 players, of which 70 players were within the <= 20 group (11.82% of the total players), 225 players in the 21-25 group (38%), 175 players in the 26-29 group (29.56%), 87 players in the 30-32 group (14.67%), and 35 players in the >= 33 group (5.91%). In the second division there were a total of 630 players, of which 66 players were within the <= 20 group (10.48% of the total number of players), 254 players in the 21- 25 group (40.32%), 147 players in the 26-29 group (23.33%), 90 players in the 30-32 group (14.29%), and 73 players in the >= 33 group (11.59%).

In the First Division, the 26-29 age group had the highest number of injuries (175 injuries; 29.56%), being the second age group with the second highest number of players (175 players; 29.56%), while the age group under or equal to 20 years old had the lowest number of injuries (4 injuries; 2.23%), being the fourth age group with the highest number of players (70 players; 11.82%).
In the Second Division, the 21-25 age group had the highest number of injuries (61 injuries; 35.88%), being the age group with the highest number of players (254 players; 40.32%), while the under 20 age group had the fewest injuries (5 injuries; 2.94%), being the age group with the lowest number of players (66 players; 10.48%).

Table 5
Number of injuries according to minutes of play in the First Division

	N = 179					
	Part 1			Part 2		
	0-15	16-30	31-45	46-60	61-75	76-90
No. Injuries (%)	15 (9,49%)	26 (14,52%)	31 (17,32%)	39 (21,79%)	41 (22,9%)	25 (13,97%)

Table 6
Number of injuries according to minutes of play in the second division

N = 170						
	Part 1				Part 2	
	0-15	16-30	31-45	46-60	61-75	76-90
No. Injuries (%)	13 (7,65%)	15 (8,82%)	34 (20%)	34 (20%)	35 (20,59%)	39 (22,94%)

In the First Division, the time period with the most injuries was between 61' and 75', with 41 injuries (22.90% of the total injuries), while the first 15 minutes of the first half was when the least number of injuries appeared (15 injuries; 9.49%). As for the Second Division, the period of time when the most injuries appeared was in the last 15 minutes of the second half with a total of 39 injuries (23% of the total number of injuries), while the first 15 minutes of the first half was when the least number of injuries appeared (13 injuries; 7.65%).

Discussion and conclusions

Soccer shows a higher II than the rest of sports, as shown by Stevenson, Hamer, Finch, Elliot, and Kresnow (2000), hence the aim of this study is to know the injuries produced throughout the 2016/2017 season of the Spanish first and second division according to the type of injury (muscular type or not); position of the player (goalkeeper, defender, midfielder, and forward); minute in which the injury occurs (0-15, 15-30, 30-45, 45-60,60-75 and 75-90), and the age of the player (<=20, 21-25, 26- 29, 30-32, >=33).

After analyzing the results, it can be seen that the most predominant type of injury in soccer, both in first and second division, are muscular injuries (Arnason et al., 2004; Leventer, Eek, Hofstetter, and Lames, 2016; Olmedilla Zafra et al., 2009; D. Hawkins and W. Fuller, 1999; Volpi, Melegati, Tornese, and Bandi, 2004 and (Hawkins, Hulse, Wilkinson, Hodson, and Gibson, 2001). Muscle injuries exceed 50% of those recorded in this work, these results being similar to those obtained by Noya Salces, and Sillero Quintana (2012) in the 2008-2009 season. The rate of muscle injuries continues to increase progressively year after year, while the II of other types of injuries is maintained over the years (Dauty and Collon, 2011).

Several studies show how the type of injury suffered by the athlete differs depending on the demarcation he/she occupies, as can be seen in (Ekstand, Waldén, and Hägglund 2004; Carling, Orhant, and LeGall 2010; Hawkins and Fuller 1996; Hodgson Phillips 2000; Faude, Meyer, Federspiel, and Kindermann 2009; and Ryynänen et al. 2013), while other studies claim the opposite (Morgan and Oberlander, 2001; Dauty and Collon, 2011; Dvorak and Junge, 2000; and Hawkins and Fuller, 1998). Attending to player demarcation, we note that in both Noya Salces and Sillero Quintana (2012), Andersen, Tenga, Engebretsen, and Bahr (2004), midfielders and forwards, and Carling, Orhant, and LeGall (2010), Price, Hawkins, Hulse, and Hodson (2004), Ryynänen et al. (2013) are athletes who have a high II, in contradiction to Morgan and Oberlander (2001), where forwards do not suffer too many injuries.

Regarding our study, the results we have obtained have been that the position that suffers more injuries are the defenders, a result that we can contrast in Hawkins and Fuller (1996), Hawkins and Fuller (1999), and Peterson, Junge, Chomiak, Graf-Baumann, and

Dvorak (2000), so we can say that if we attend to the injuries according to the position that occupies a soccer player on the field there are discrepant results. Where there is total agreement is in stating that the position with fewer injuries is the goalkeeper (Ryynänen et al., 2013) (Faude, Meyer, Federspiel, and Kindermann, 2009).

With regard to injuries depending on the age of the soccer player, there is little literature. Majewski, Susanne, and Klaus (2006) study in their case the knee injuries during 10 years of a large number of athletes of different modalities and show how the athletes between 20 and 29 years of age are the ones who suffered the most injuries, almost doubling in number the next age range, which includes athletes between 30 and 40 years of age. Although this study does not focus solely on soccer, it coincides exactly with the results of our study, where athletes aged 21 to 25 years and 26 to 29 years are those who suffer more injuries, as in Stevenson, Hamer, Finch, Elliot, and Kresnow (2000), where it is found that athletes between 26 and 30 years have a higher II. Morgan and Oberlander (2001) analyzed the influence of different variables in the MLS, including age, reaching the conclusion that the age of the athlete is not a determinant in terms of injury incidence, adding that it is also not a determinant for the severity of the injury.

Regarding the minute in which the injury occurs, we can observe that in the Spanish first division during the 2016/2017 season the time period in which a greater number of injuries occur is between minutes 61 and 75 followed by the period between 46 and 60, so it is in the second half where the greatest number of injuries occur (Dvorak, Junge, & Derman, 2011). This agrees with the studies of Hawkins, Hulse, Wilkinson, Hodson, and Gibson (2001) and D. Hawkins and W. Fuller (1999) where a higher frequency of injuries was observed during the last 15 minutes of the first half, seen in Dvorak, Junge, and Grimm (2007) and the last 30 minutes of the second half. With respect to the data from our study on the Spanish second division, where the period of time in which more injuries appear is in the last 15 minutes of each half, we do see that there is a concordance with the rest of the literature, as shown by Junge, Dvorak, and Graf-Baumann (2004). There is strong agreement across the literature, as in Sul Yoon, Chai, and Won Shin (2004), Junge, Dvorak, and Graf-Baumann (2004), Hawkins, Hulse, Wilkinson, Hodson, and Gibson (2001), and D. Hawkins and W. Fuller (1999) that fewer injuries occur in the first 15 minutes of play than during the rest of the game. With respect to the type of injury and according to the results obtained in our study, we can conclude that the most common injuries in the first and second division during the 2016/2017 season have been muscle injuries, being higher in the second division than in the first division.

If we talk about the position of the players on the field, we conclude that the players who suffered the most injuries during the 2016/2017 season in first and second division were the defenders, followed by midfielders and forwards, and in last place the goalkeepers, which are well below the rest. Regarding the age of the footballers, we deduce that the age ranges where there is a higher number of injuries were 21-25 years old and 26-29 years old, which are also the ones that encompass a higher number of players compared to the rest of the ranges.

Finally, if we talk about the minute in which the injury occurs, we have come to the conclusion that in the Spanish first division during the 2016/2017 season the period of time with more injuries was between 61' and 75', followed by 46'-60', while in the second division they were in the last fifteen minutes of each part.

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