

Occurrence and type of sports injuries in elite young Brazilian soccer players

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Summary

Introduction: The aim of this study was to analyze the injuries affected in young soccer athletes of high performance categories, under (U) -11, U-13, U-15, U-17 and U-20 years and the associations between the variables related the injuries.

Material and method: Data were collected from medical records of the medical department of 143 injured athletes belonging to a club in the first division of the Brazilian Championship. The young athletes were evaluated in the following categories: under (U) -11, n = 30 (10.45 ± 0.5 years), U-13, n = 34 (12.15 ± 0.3 years) U-15, n = 23 (14.56 ± 0.4 years), U-17, n = 24 (16.52 ± 0.5 years), U-20, n = 32 (18.24 ± 0.6 years). Data collection was conducted from January 2014 to November 2014 (11 months). The data were analyzed and classified according to the categories and the lesions identified as per the recommendations of the study group in injury FIFA Medical Assessment and Research Centre.

Results: The results showed that there was a total of 200 lesions in all categories, the teams U-15, U-17, U-20 stood out with the greatest occurrences of injuries (p<0.05) and index of injuries (p<0.05). The Pearson correlation test showed a positive and significant coefficient of correlation (r = 0.879; p < 0.05) between index of injuries and hours of game.

Conclusions: It was observed that the occurrence and characteristics of lesions of young soccer players in different categories are higher according to the increasing number of games and that the older groups demonstrate a greater number of lesions more similar to those in adults.

Key words:
Soccer. Occurrence. Injury.

Ocurrencia y el tipo de lesiones deportivas en los jóvenes jugadores de fútbol brasileños de élite

Resumen

Introducción: El objetivo del estudio fue analizar las lesiones en los jóvenes futbolistas en categorías de alto rendimiento (SUB) -11, SUB -13, SUB-15, SUB-17 and SUB-20 años y las asociaciones entre las variables relacionadas con las lesiones.

Material y métodos: Se recogieron datos de los registros médicos del departamento médico de 143 jóvenes futbolistas pertenecientes a un club de la primera división del Campeonato Brasileño. Los jóvenes futbolistas fueron evaluados en las siguientes categorías: SUB -11, n = 30 (10,45 ± 0,5 años), SUB-13, n = 34 (12,15 ± 0,3 años), SUB-15, n = 23 (14,56 ± 0,4 años), SUB-17, n = 24 (16,52 ± 0,5 años) y SUB-20, n = 32 (18,24 ± 0,6 años). La recolección de datos se llevó a cabo a partir de enero 2014 a noviembre 2014 (11 meses). Los datos fueron analizados y clasificados por las categorías y las lesiones identificadas de acuerdo con las recomendaciones del grupo de estudio en la lesión de Evaluación Médica de la FIFA y el Centro de Investigación.

Resultados: Los resultados mostraron que hubo un total de 200 lesiones en todas las categorías. Los equipos B-15, B-17 y B-20 se destacaron con las mayores ocurrencias de lesiones (p<0,05) y el índice de lesiones (p<0,05). La prueba de correlación de Pearson mostró un coeficiente de correlación positivo y significativo (r = 0,879; p < 0,05) entre el índice de lesiones y horas de juego.

Conclusiones: Se observó que la incidencia y características de las lesiones de los jóvenes futbolistas en diferentes categorías son más altas de acuerdo con el aumento del número de juegos y que los grupos de mayor edad demuestran un mayor número de lesiones más similares a las de los adultos.

Palabras clave:
Fútbol. Ocurrencia. Lesión.

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Introduction

Soccer is a high performance sport which is practiced young athletes. Soccer has undergone changes in recent years, mainly due to high training loads that require athletes to work near their maximum which leads to a higher predisposition to muscle fatigue¹. This causes players to have greater demands regarding physical performance leading them to early maturation², and being more susceptible to injury³.

It is estimated that for every 1000 hours of game play, the number of injuries is, on average, four to six times higher than the number of lesions that occur during training⁴. In professional athletes it is estimated that three out of four soccer players suffer for years, a performance limiting lesion⁵.

Fédération Internationale de Football Association (FIFA), according to the Medical Assessment and Research Centre, defined as any injury occurring suffered by a player in competition or in training, which requires him or her to interrupt their activity and prevents them from participating in at least one practice or game⁶. Thus, it is important that there is a correct application of the training load to avoid muscular imbalances³, with a recovery period sufficient to allow recovery from muscular fatigue⁷.

The practice of physical activity for children and adolescents is encouraged throughout the world⁸, however, another aspect that must be considered is the increase in numbers of weekly training and games in all categories, regardless of age, which puts the athlete potentially beyond their physiological limits of age⁵. So it is plausible to believe that the occurrence of injuries tends to be higher in younger practitioners who have a high volume of sports.

Sporting consequences of these injuries can be numerous, ranging from a pre disposition to injury in adulthood, through technical limitation to the early end of career⁹. Thus, identifying the occurrence of injuries in young athletes and verify possible relations with a time of sports practice, the coach can add information to prevent these injuries. The reduction of these sports injuries is important to the health of young athletes and could have a long-term economic impact on health care¹⁰.

The incidence of injuries and their risk factors in adult soccer players are objects of many studies¹¹⁻¹³. However, while approximately 45% of players aged under 15 have suffered at least one injury¹⁴, few studies have investigated the injuries in young athletes and their relations with the training time and game according to their age. Thus, the present study has the hypothesis that the occurrence of injuries is greater in the categories of soccer players approaching the professional category and that there is a positive association between injuries and hours game. Therefore, the aim of this study was to analyze the injuries affected in young soccer athletes of high performance categories, under (U) -11, U-13, U-15, U-17 and U-20 years and the associations between the variables related the injuries.

Material and method

This research is a descriptive cross-sectional and correlational study. Data were collected from the 143 medical records of a club in the first division of the Brazilian Championship. The sample was chosen

intentionally because it was composed of all the athletes who attended the medical department (MD). Medical records were evaluated in the following categories: Under (U) -11, n = 30 (10.45 ± 0.5 years), U-13, n = 34 (12.15 ± 0.3 years) U-15, n = 23 (14.56 ± 0.4 years), U-17, n = 24 (16.52 ± 0.5 years), U-20, n = 32 (18.24 ± 0.6 years). To be included in the study, medical records had to meet the following criteria: (a) lesion caused and (b) received care in the medical department of the club.

The study was based on data from the medical records medical department (MD), from January 2014 to November 2014, totaling 11 months. The data were analyzed and classified according to the age categories and the injuries identified. During the season, athletes with confirmed or suspected lesions were referred to the MD, where the doctor collected the following information: description of the injury (e.g. muscle, tendonitis, bruises, sprains, fractures or dislocations), anatomic site of the lesion (e.g. trunk, head, arm or leg), type of treatment (e.g. curative, anti-inflammatory drugs, surgeries, rehabilitation including ice, heat, ultrasound, shortwave and transcutaneous electrical stimulation), and date of admission to the initiation of treatment. When analyzing the data, it was ranked according to the type of acute traumatic injury and anatomic location from data originally collected in the patient chart, according to the recommendations of the study group in injury FIFA Medical Assessment and Research Centre⁶.

To protect the identity of the club and the player, each player was given a unique coded identification number, which was known only by the club's medical staff and researchers. The data were analyzed in IBM® SPSS® Statistics Version 21 and presented descriptively. In addition, the index of injuries (IOI) was calculated by formula:

$$IOI = \frac{i \times 1000}{TH}$$

Onde:

IOI = Index of injury;

i = Injuries for each athlete

TH = Total hours (Training Hours of training + hours of game)

The Chi-square test was applied to compare the occurrence of injuries among categories. Shapiro-Wilk test was performed to confirm proximity of the sample data with a normal distribution. The one way ANOVA was carried out in groups and Bonferroni post-hoc test was performed for multiple differences of variables among categories. The Pearson correlation test was used to analyze the associations between the study variables. The study adopted the value of $p < 0.05$ for statistical significance.

Results

During the data collection period there was a total of 200 injuries (Table 1). There were a greater number and variety of injuries in older compared to younger age groups with 66 injuries in the U-17 team and 61 injuries U-20 compared to 12 injuries in the U-11 and 15 injuries in the U-13 teams. The commonest injuries were muscle stretch injuries (n=33) and contusions (n=32). Ankle injuries (N=26) were more common than knee injuries (n=15).

Table 1. Descriptive values of the types of lesions in the affected category Under (U) -11, U-13, U-15, U-17 and U-20.

Types of Injuries	U-11	U-13	U-15	U-17	U-20	Total
Muscle Stretch	3 (25%)	1 (6%)	10 (22%)	9 (14%)	10 (16%)	33 (16%)
Myalgia	0	5 (33%)	7 (15%)	15 (23%)	4 (6%)	31 (15%)
Low Back Pain	0	2 (13%)	3 (7%)	1 (1%)	3 (5%)	9 (4%)
Trauma	2 (17%)	0	2 (5%)	12 (18%)	14 (23%)	30 (15%)
Contusion	5 (42%)	4 (27%)	13 (28%)	7 (11%)	3 (5%)	32 (16%)
Tendonitis	0	1 (6%)	2 (4%)	3 (4%)	4 (7%)	10 (5%)
Sprain No Diagnosis	1 (8%)	1 (6%)	1 (2%)	4 (6%)	6 (10%)	13 (7%)
Knee Sprain	1 (8%)	0 (6%)	2 (4%)	3 (5%)	3 (5%)	9 (5%)
Ankle Sprain	0	1 (6%)	6 (13%)	11 (17%)	8 (13%)	26 (13%)
Anterior Cruciate Ligament	0	0	0	0	4 (7%)	4 (2%)
Posterior Cruciate Ligament	0	0	0	0	2 (3%)	2 (1%)
Herniated Disc	0	0	0	1 (1%)	0	1 (1%)
Total	12 (100%)	15 (100%)	46 (100%)	66 (100%)	61 (100%)	200 (100%)

† U-11 until U-20, category aged 10 up to 20 years

Table 2. Exposure and occurrence of injuries by category.

	U-11	U-13	U-15	U-17	U-20	Total
N	30	34	23	24	32	143
Amount Injuries	12	15	46*	66*	61*	200
Injuries for each athlete	0.40±0.02	0.44±0.01	2.00±0.12*	2.75±0.11*	1.91±0.24*	1.40
Hours of game season	10.00±0.12	23.33±0.21	53.60±1.31*	64.60±3.45*	75.00±3.89*	226.53
Hours of training	371.25	371.25	371.25	371.25	371.25	371.25

* p<0.05; significant differences for U-11 and U-13.

Table 3. Analysis of correlation between amounts of injuries and hours of training and game.

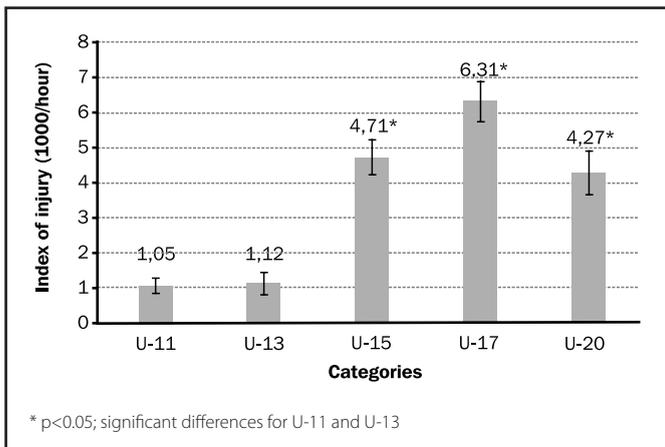
		Amount of injuries	Hours of game	Injuries per athlete	Hours of training + game
Hours of game	r	0.970*			
	p-value	0.006			
Injuries per athlete	r	0.965*	0.894*		
	p-value	0.008	0.041		
Hours of training + game	r	0.970*	0.999*	0.894*	
	p-value	0.006	0.000	0.041	
Index of injury 1000/h	r	0.954*	0.879*	0.999*	0.879*
	p-value	0.012	0.049	0.000	0.049

* p < 0.05

Table 2 displays the number of injuries and number of hours of exposure to game and training. All age categories had the same training pattern, with an average of five workouts per week lasting approximately 1.5 hours, totaling 371.25 hours of training. The U15, U17 and U20 categories had greater occurrence of injuries and greater number of hours of gaming sessions (p <0.05) when compared to the U-11 and

U-13 categories. The same result was found in the index of injuries (p <0.05) in Figure 1.

Table 3 shows data correlating the training and game hours with the number of injuries. The results suggest that the practice time the activity is directly related to the incidence of injuries, because the correlation shows that the longer the athletes train or play the more likely to injure.

Figure 1. Analysis of index of injuries in the categories.

Discussion

A total of 200 injuries were documented during the season of 2011, resulting in 1.4 injuries for each athlete / year on average, a rate close to the studies of Walden *et al.*¹⁵, Chamari *et al.*¹⁶ and Ekstrand *et al.*¹⁷. Results of recent studies suggest most soccer injuries are caused by direct trauma resulting in contusions and muscle injuries, leading to strains and sprains in the lower extremities¹⁸⁻²⁰. In our study, we see a similar pattern in our results compared to the results of these authors. Furthermore, the location of lesions recorded in our study was similar to that reported in other studies^{15,19,21} affecting predominantly the knee and ankle joints and muscles of the thigh and leg. The disproportion of injuries among body segments, upper and lower limbs, can be attributed to the higher demand of the lower extremity in soccer⁷.

There was a gradual increase in the number of games according to the increasing age group of players, i.e. the higher the age group the higher the number of games. This finding is corroborated by Bengtsson *et al.*²² who observed with great concern that the time spent in match play massively increases for soccer athletes as their level of professionalism rises and age advances.

The studies by Ribeiro *et al.*²³ and Junge *et al.*²⁴ also refer to the same amount of training 90 minutes a week. This situation seems to demonstrate a standardized duration for training in soccer players. However, the teams U-15, U-17 and U-20 had an average incidence, a fact different to that shown with the average of the whole group. When we observe the prevalence of these three categories with the literature we noted similar rates found in other studies with young soccer players^{17,24,25}, however, these injury rates were higher than those found in studies with adults^{21,26}. These results corroborate the hypothesis highlighted by this study. Besides the large number of games this higher incidence may be explained by a weakness in technique and tactics, as well as a possible lower muscle strength, endurance, coordination and experience of young athletes. Changes in the system of training young athletes, focusing on technique and ability beyond the physical component, may help to minimize the incidence of sports injuries²⁷.

Some studies have shown large differences in incidence rates of injuries recorded in soccer^{17,24,28}, attributed these differences to conceptual contradictions, study design, methods of data collection, observation schedules, and characteristics of the samples studied. The system for data collection has also been the subject of numerous discussions. Fuller *et al.*⁶ argue that a proper injury record should include components such as location, type and circumstances of the injury. Junge and Dvorak²⁸ recommend that for the exact calculation of the incidence of injuries the number of games and practice sessions should be documented for each individual athlete. Moreover, they claim that the registration of sports injuries should be done prospectively because retrospective data have limited value, and prospective studies as well as evaluating the incidence of injury can also identify groups and risk factors.

In addition, this study found a high association with uptime with the occurrence of injuries. The results corroborate the findings by Keller *et al.*²⁹ and Weber³⁰. The high number of games and the time devoted to training sessions become more frequent occurrence of muscle and osteoarticular injuries in athletes³⁰.

The present study examined the occurrence of lesions in base class athletes, however, it is not stuck to check the mechanisms of these lesions and or the severity thereof, which may somehow be considered limitations of the study.

Conclusions

As was expected the hypotheses, the present study observed that the occurrence of characteristics of the injuries of young soccer players in different age categories are larger in older age groups and that the larger the number of games played the greater the number of injuries sustained. Thus, the soccer coaches can avoid injury by overtraining in young athletes. For further studies, it is recommended to analyze the different types of training in basic categories in soccer.

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