Original Article

Training habits, motivation, quality of life and sport injuries in 12 to 15 years old basketball players

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ABSTRACT

Background: Previous studies of basketball injury have not been able to compare injury incidence and risk with their healthy habits. Purpose: To determine rates and risks of injury in Spanish boys and girls basketball players. Study Type: Descriptive epidemiology study. Methods: A survey was carried out on injuries produced in basketball players during the seasons 2006-07, 2007-08 and 2008-09, which included their type, incidence and treatment. There took part 217 players - 12 to years old -. They were given a questionnaire related to habits and sports injuries and the SF-36 v2 Health Questionnaire. Results: The injuries took place both while competition and training, being ankle sprain the most frequent injury in both cases. After ankle sprain; the prevailing injuries were sprain - luxation of the fingers and knee sprain. Most of the players who got injured were the base, the forward, and the guard. A 53 % had suffered some injury in the last three seasons, being falling off the most frequent cause. The incidence of injuries out of every 1000 hours of exhibition found in the study is 1.39. There have been found significant differences in the exposure to injuries at the outcome of skill circuits at Interval Training work during training hours. The mental component is an important factor to be considered in all caused injuries. **Key words:** BASKETBALL, EPIDEMIOLOGY, INCIDENCE, INJURY, TRAINING.

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INTRODUCTION

This study reviews the training habits and their relationship to the incidence of injuries in physical activity in basketball. There is currently no information on the type of injury, treatment and recovery, the incidence of the same, especially in ages of sports training. To be able to decrease the amount of injuries in this area, it is necessary to know accurately the type and incidence of injuries with these players (Sánchez Jover y Gómez, 2008a; Bahr and Holme, 2003). The goal of the research is a descriptive study of injuries sustained by male and female cadet and infant players during the 2006-07, 2007-08 and 2008-09 season.

MATERIALS AND METHODS

The survey included 25 basketball teams. The sample consisted of 217 players divided as follows:
• 8 teams in the men's junior category (12 to 13 years old), for a total of 63 players.
• 4 teams of female junior category (12 to 13 years old), for a total of 38 players.
• 9 teams in the male cadet, (14 to 15 years old) for a total of 92 players.
• 3 teams in the female cadet (14 to 15 years old), for a total of 24 players.

For data collection, a self-fulfillment questionnaire has been developed. An "expert committee" followed the procedure related to the preparation of the questionnaire. The expert committee, set up a series of questions which finally, after a process of piloting, selected those of the final questionnaire. The questionnaire sought the variables related to the production and prevention of injuries in basketball. The questionnaire consists of the following blocks: training habits, sports injuries and the SF-36 v2 (Alonso et al., 1998).

RESULTS

Healthy habits

Of the 217 players who participated in the study, 84.8% (n = 184) conducted a medical examination prior to the 2008-2009 season, and 15.2% (n = 33) did not realize it. 92.6% (n = 201) did spring training and the remaining 7.4% (n = 16) made no spring training.

Table 1 shows the time spent stretching or flexibility exercises at the beginning and end of training, and Table 2 shows the time spent stretching or flexibility exercises before and at the end of the matches:

Table 1 Time spent stretching at the beginning and end of training. Percentage to total respondents

	TRAINING			
	BEFORE		AFTER	
Time	n	%	n	%
No Stretching or occasionally make	2	0.9	40	18.4
Less than 5 minutes	91	41.9	66	30.4
From 6 to 15 minutes	114	52.5	109	50.2
Over 15 minutes	10	4.6	2	0.9
TOTAL	*217*	*100*	*217*	*100*

Table 2. Spent time stretching before and at the end of games. Percentage to total respondents

	COMPETITION			
	BEFORE		AFTER	
Time	n	%	n	%
No Stretching or occasionally make	2	0.9	64	29.5
Less than 5 minutes	91	41.9	56	25.8
From 6 to 15 minutes	114	52.5	96	44.2
Over 15 minutes	10	4.6	1	0.5
TOTAL	*217*	*100*	*217*	*100*

The following Table 3 shows what constituted fitness training with the players who participated in the study according to sex.

Table 3. Fitness training, differentiated by gender.

FITNESS	BOYS	%	GIRLS	%
Circuits	84	54.19	39	62.90
Continuous Running	83	53.54	51	82.25
Speed	73	47.09	47	75.80
Fartlek	77	49.67	37	59.67
Bounding and plyometrics	45	29.03	48	77.41
Reaction rate	49	31.65	32	51.61
Individual strength training or with colleagues	45	29.03	30	48.38
Static flexibility exercises	36	23.22	17	27.41
Interval Trainning	27	17.41	25	40.32
Flexibility helps	25	16.12	23	37.09
Launch of medicine ball	26	16.77	12	19.35
Isometric strength	13	8.38	11	17.74
Muscle building with weights	12	7.74	5	8.06
Others	1	0.64	5	8.06

It has been compared to the 90.32% seen performing adequate rest between training sessions per week and the competition, and 42.86% do not use taping as needed, and 41.47% use both training and in matches. As for the intensity levels of the training sessions, we observed that 31.80% working at different levels of intensity depending on the characteristics of each player, while 39.17% do all players on a team the same training load and with the same intensity. We found no significant differences between work at different levels of intensity and production of lesions. Pearson Chi-square (0.854) (df 2) (p = 0.652). We have not found significant differences between the use of taping and production of lesions. Pearson Chi-square (3,790) (df 2) (p = 0.150).

Looking at the training habits and production of lesions, we found significant differences in the following variables:

- Perform skills circuit training sessions influences the decrease in the production of lesions. Pearson Chi-square (10.921) (gl 1) (p = 0.001).
- Working the race at intervals (Interval Trainning) also influences the decrease in the production of lesions. Pearson Chi-square (5.077) (df 1) (p = 0.024).

Basketball injuries

115 players (52.99%) of the sample have experienced a sports injury during the seasons 2006-2007, 2007-2008 or 2008-2009, with a total of 218 injuries, of which 174 correspond to original lesions and 44 recurrences. Exist an index of 1.39 injuries per 1000 hours of exposure (both training and competition). These injuries have caused low sport 538 weeks with an average of 3.09 weeks out with injury. Of the 115 players, 44 (38.26%) had suffered the same injury previously considered these lesions as recurrences. 85 children were injured (54.8% of boys) and 30 girls (48.4% of girls). Table 4 shows the production of injuries by season:

Table 4. Total injuries and injury incidence per 1000 hours of exposure per season

SEASON	Injuries	%	Injury rate per 1000 hours
2008-2009	68	39.09 %	1.30
2007-2008	65	37.35 %	1.24
2006-2007	41	23.56 %	0.78
Total	174	100 %	1.39

Looking at the injury according to player position, we found that subjects of the 115 injured, 30 players (26.09%) were point guards, 20 (17.39%) shooting guards, 27 (23.48%) small forwards, 15 (15,05%) power forwards and 23 (20%) centers. As for gender differences in Tables 5 and 6 shows players who have been injured basketball during the period of study:

Table 5. Injuries of 12 to 13 years old players by position

12 to 13 years old

Male			**Female**		
Position	**n**	**%**	**Position**	**n**	**%**
Point Guard	10	31.2	Point Guard	4	21
Shooting Guard	9	28.1	Shooting Guard	4	21
Small Forward	4	12.5	Small Forward	6	31.5
Power Forward	3	9.3	Power Forward	0	0
Center	6	18.7	Center	5	26.3
Total	*32*	*100*	*Total*	*19*	*100*

Table 6. Injuries of 14 to 15 years old by position

14 to 15 years old

Male			**Female**		
Position	**n**	**%**	**Position**	**n**	**%**
Ponit Guard	14	26.4	Point Guard	2	18
Shooting Guard	6	11.3	Shooting Guard	1	9
Small Forward	14	26.4	Power Forward	3	27
Power Forward	11	20.7	Power Forward	1	9
Center	8	15	Center	2	18
Total	*53*	*100*	*Total*	*11*	*100*

No significant differences were found between the position of the player and the production of lesions: 1.464 Pearson Chi square (df 4) (p = 0.833), nor differences were found regarding sex: 1.661 Pearson Chi square (df 1) (p=0.197).

Regarding specific types of injuries suffered by players surveyed are shown in Table 7:

Table 7. Particular type of injury.

Location	**n**	**%**
Ankle sprain	64	36.8
Sprain / dislocation of hand fingers	25	14.3
Knee sprain	14	8
Tendinitis / patellar chondropathy	8	4.5
Low back pain	8	4.5
Quadriceps contusion	7	4
bone crack	6	3.4
muscle contracture	6	3.4
Tendinitis	5	2.9
Dislocation of patella	3	1.7
hamstring	3	1.7
Hernia / lumbar disc protrusion	3	1.7
Meniscal tear	1	0.5
Concussion	1	0.5
Temporomandibular arthritis	1	0.5
Plantar fasciitis	1	0.5
Other	18	10.3
Total	174	

Dividing a game of Basketball in the four periods regulatory, the third quarter in a game, has the greatest number of lesions present (30%), followed by the second quarter (21%) and last quarter (19%) (Table 8).

Table 8. Distribution of injuries during competition.

Injury	n	%	Cumulative %
Warm-up	9	11.4	11.39
First period	9	11.4	22.78
Second period	17	21.5	44.29
Third period	24	30.3	74.66
Fourth period	15	19	93.64
After the game	5	6.3	100
Total	79	100	

Of the 115 players who sustained an injury in the study period, 88 players (76.5%) received treatment. In addition, we found that 81.7% received care or first aid after injury, and that attention was conducted by health personnel in 95 cases (83%) and by the coach or non-medical personnel in 19 cases (17%).

Treatment and rehabilitation

Table 9 shows that most of the players (87%) recovered well and could return to the sport active normally. 89 players (80% of injured) could immediately join sports competition. However, the remaining players who could not sit up, 19 (86%) were added gradually to the efforts of competition, against 3 players (14%) who did not.

Table 9. Sports Injury Recovery

	n	%
Recovery	100	87
Recovery without returning to sports	3	2,6
No recovery and treated	10	8,7
Without recovery and sequelae	2	1,7
Total	115	100

The recovery process was followed by a physiotherapist in almost half of injured players (45%), and was followed by the player in 38% and by the coach or other in 15%. (Table 10)

Table 10. Carrying out of the recovery process.

	n	%
Physiotherapist	52	45,2
By the same player	44	38,3
Coach	17	14,8
Other	2	1,7
Total	115	100,0

SF-36 results

Table 11 shows the results of SF-36 players:

Table 11. Results of the SF-36

	n	Minimum	high	Media	SD
Physical Function (0-100)	217	.00	100.00	89.6774	19.92380
physical role (0-100)	217	.00	100.00	83.6598	28.35294
bodily pain (0-100)	217	.00	100.00	82.3088	21.68934
General health (0-100)	217	30.00	100.00	82.2396	16.67965
Vitality (0-100)	217	25.00	90.00	69.0783	13.89705
Social function (0-100)	217	.00	100.00	90.5530	17.30662
Emotional role (0-100)	217	.00	100.00	91.2442	23.07704
Mental health (0-100)	217	24.00	88.00	70.8940	14.93048
N	217				

Table 12 shows the correlation between the scores of the SF-36 sample with respect to gender:

Table 12. SF-36 scores and their correlation with sex.

	gender	n	Media	SD	Standard error
Physical Function (0-100)	male	155	88.70	21.97	1.76
	female	62	92.17	13.26	1.68
Physical role (0-100)	male	155	81.77	29.61	2.37
	female	62	88.70	23.81	3.02
Bodily pain (0-100)	male	155	83.53	20.46	1.64
	female	62	79.24	24.38	3.09
General health (0-100)	male	155	82.35	16.67	1.33
	female	62	81.95	16.81	2.13
Vitality (0-100)	male	155	68.67	13.64	1.09
	female	62	70.08	14.58	1.85
Social function (0-100)	male	155	90.24	17.80	1.43
	female	62	91.33	16.09	2.04
Emotional role (0-100)	male	155	91.82	23.52	1.88
	female	62	90.32	21.24	2.69
Mental health (0-100)	male	155	70.55	15.09	1.21
	female	62	71.74	14.59	1.85
Physical component	male	155	53.02	6.72	.54
	female	62	53.77	5.57	.70
Mental component	male	155	49.06	7.23	.58
	female	62	48.98	7.15	.90

Table 13 shows the correlation between the scores of the SF-36 sample with respect to category (12 to 13 years old or 14 to 15 years old):

Table 13. SF-36 scores and their correlation with the category.

	Age	n	Media	SD	Standard error
Physical Function (0-100)	12 to 13	101	86.23	23.58	2.34
	14 to 15	116	92.71	15.52	1.44
Physical role (0-100)	12 to 13	101	79.86	34.17	3.40
	14 to 15	116	87.14	21.29	1.97
Bodily pain (0-100)	12 to 13	101	83.30	21.36	2.12
	14 to 15	116	81.43	22.02	2.04
General health (0-100)	12 to 13	101	80.66	16.59	1.65
	14 to 15	116	83.61	16.70	1.55
Vitality (0-100)	12 to 13	101	68.86	14.45	1.43
	14 to 15	116	69.26	13.45	1.24
Social function (0-100)	12 to 13	101	90.47	18.72	1.86
	14 to 15	116	90.62	16.05	1.49
Emotional role (0-100)	12 to 13	101	85.47	30.33	3.01
	14 to 15	116	96.55	11.10	1.03
Mental health (0-100)	12 to 13	101	71.60	16.10	1.60
	14 to 15	116	70.27	13.86	1.28
Physical component	12 to 13	101	52.54	7.24	.72
	14 to 15	116	53.83	5.56	.51
Mental component	12 to 13	101	48.69	8.64	.86
	14 to 15	116	49.35	5.66	.52

Table 14 shows the correlation between the scores of the SF-36 sample with respect to the production of injury:

Table 14. SF-36 scores and their correlation with the production of lesions.

	Injury	N	Media	SD	Standard error
Physical Function (0-100)	Yes	113	90.26	18.32	1.72
	No	104	89.08	21.57	2.11
Physical role (0-100)	Yes	113	84.80	26.39	2.48
	No	104	82.61	30.12	2.95
Bodily pain (0-100)	Yes	113	80.73	22.71	2.13
	No	104	84.01	20.48	2.00
General health (0-100)	Yes	113	82.75	17.79	1.67
	No	104	81.68	15.43	1.51
Vitality (0-100)	Yes	113	70.39	13.33	1.25
	No	104	67.64	14.41	1.41
Social function (0-100)	Yes	113	89.82	19.80	1.86
	No	104	91.34	14.15	1.38
Emotional role (0-100)	Yes	113	91.74	22.94	2.15
	No	104	91.02	22.86	2.24
Mental health (0-100)	Yes	113	73.09	14.64	1.37
	No	104	68.50	14.94	1.46
Physical component	Yes	113	53.03	6.01	.56
	No	104	53.45	6.85	.67
Mental component	Yes	113	49.70	7.40	.69
	No	104	48.33	6.93	.67

We found significant differences between 'child' and 'cadet' for Physical Function variable, t (168.804) = -2.352 p = 0.020 <0.05, and Role Emotional variable, t (123.227) = -11.073 p = 0.0001 <0.05.

DISCUSSION

Studying injuries in basketball, it was observed that the lesions had both when racing and training. The ankle sprain is the most common lesion in both training sessions and in competition. After ankle sprain, sprain-dislocation of the fingers of the hand, knee sprain, tendinitis / chondropathy knee and back pain are the most frequent injuries.

53% of players have been injured in the last three seasons. This percentage is similar to another study (Cumps et al., 2005). In male children, 30% of the injured playing in point guard position. In contrast, more girls are injured players who play small forward (31.5%), followed by the centers (26.3%). These results are similar to other study (Sanchez Jover y Gomez, 2008b). Matches with other study (Borowski et al., 2008) in that most basketball players who are injured are forming the point guards (50.3% boys and 45.9% girls). In other studies, they found that players who are injured are more centers, followed by point guards and shooting guards and finally the small forwards. In epidemiological studies in adult basketball or professional, there is a greater number of injuries of players playing in the position of power forward or center (Baht and Holme, 2003; Cumps et al., 2007; Meeuwisse and Sellmer, 2003).

The injury rate per player per year is 1.39. This index is smaller than those obtained in other study, 5.2 (Sánchez Jover y Gomez, 2008b). In addition, this index is also lower than indicated by other authors: 7.6 (Gutgessell, 1991); 9.8 (Cumps et al., 2003) and 3 (Lindblad, 1992).

The rate of ankle sprain injury is 0.41 per 1000 hours of exposure, being in other studies of 3.85 (Mckay et al., 2001) and 5.5 (Leanderson and Nemeth, 1993).

The rate of knee sprain is 0.11 per 1000 hours of exposure. This result is lower than other study, 0.46 (Sanchez Jover y Gomez, 2008b) Other studies show different results. This index, basketball training, is 0.7 (Meeuwisse and Sellmer, 2003) and 0.32 in girls (Mihata et al.,2006). Also, this index is 0.31 (Meeuwisse and Sellmer, 2003) and similar to that in boys, with 0.12 (Leanderson and Nemeth, 1993).

By separating the lesions between sexes, were injured, 54.8% of boys and 48.4% of girls. In general, there is a consensus that there is a higher injury rate in women than in men. (Cumps et al., 2003) Arendt and Dick, 1995; Borowski et a., 2008; Deith et al., 2008; Drakos, 2010; Harmer, 2005 Hickey et al., 1997; Hosea et al., 2000; Lindblad, 1992; Meeuwisse and Sellmer, 2003; Messina et al., 1997; Trojian and Collins, 2006).

The most common type of injury is the ankle sprain, with 36%, being 44.6% in other study (Sanchez Jover y Gomez, 2008b), followed by sprain or dislocation of the fingers (14.3%), knee sprains (8%) and fourth low back pain and tendinitis / patellar chondropathy. These data are consistent with other study (Sanchez Jover y Gomez, 2008b). The percentages are similar for boys and for girls in the lesions mentioned. Most of the authors note that there is a higher incidence of lower limb injuries, mainly in the ankle (Gutgessell, 1991). It is noteworthy that, with advancing age of the sample and sprained knee takes more prominence (Dehaven and Linter, 1986).

If we consider the mechanism of injury, it appears that the most common cause is the fall with 34%, followed by contact with another player, with 27%. However, in other study (Sanchez Jover y Gomez, 2008b), the first cause was contact with another player (43.24%), followed by fall with a 35.13% and thirdly load by 21.52%. Other authors studied the mechanism of injury in ankle sprains and knee. For ankle injuries the mechanism

of injury was landing majority on another player, and knee injuries were sharp turns. (Dehaven and Linter, 1986; Gutgessell, 1991; Mckay et al., 2001).

41% of injured players was injured during training, 32% in the competition, and 26% in both activities (training and competition). In other study (Sanchez Jover y Gomez, 2008b), half of injuries occur in training and the other half in games. However, other authors have shown different results. One study found that three quarters of the injuries occur in training (Meeuwisse and Sellmer, 2003).

As for the moment is more injuries occur in the second and third period of game (51.8% in this study and 65% for 2008). We found no other studies have identified the timing of injuries in basketball.

In assessing the quality of life related to health in adolescents raises the question of using the SF-36 is designed primarily for adults. This approach involves the question that the measures in adults are appropriate for determining the quality of life of children, and if they have the same meaning for children and adults. It also makes it possible to investigate a sample of adolescents and adults using the same questionnaires, which is crucial to assess changes in quality of life and follow longitudinally.

According to the findings of the vast majority of research on quality of life, men reported higher scores than women (Goodman et al., 1997; McAllister et al., 2001; Raty et al., 2003; Vingilis et al., 2002; White et al.1999) However, in the present study, girls scored higher on Physical Function and Physical Role than boys, and boys scored higher than girls Body Pain. The notable differences in the SF-36 and the production of lesions were mainly associated with the mental and emotional health, while there was little difference in the subscales most closely related to physical health and sex.

Mean scores in the different domains of the SF-36 for all players who conducted the study, are 69 points above the size of Mental Health and Vitality, 80 points above the Physical Function, Role Physical, Pain General and Health and over 90 points Social Function and Role Emotional. When comparing the mean scores of the SF-36 in our sample with those obtained for the Spanish general population (Alonso et al., 1998), the results have lower rates of both general and by gender, and the same applies to a study for adolescents (Jorngarden et al., 2006).

CONCLUSIONS

The basketball injuries occur both in competition and in training. Ankle sprains are the most common injury in both cases. After a sprained ankle, the sprain-dislocation of the fingers of the hand and knee sprains are the most common injuries. Players who are injured are more guards and forwards, followed by the guards. 30% of injuries occur in the third quarter of the game. 53% have been injured in the last three seasons, the fall being the most frequent cause. The incidence of injuries per 1000 hours of exposure found in the study is 1.39. We found significant differences in the production of injuries and the realization of circuit skills and work in Interval training. The mental component is an important factor to consider in the production of injuries.

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