

KNEE LESIONS AND SPRAINS IN SOCCER PLAYERS OF MANAUS CITY, AMAZONAS - BRAZIL

EDUARDO TELLES DE MENEZES STEWEN¹, OSMAR PEDRO ARBIX DE CAMARGO²

SUMMARY

Fifty male and 47 female soccer players from Amazonas state teams in Manaus City were studied. The occurrence of knee sprain and resultant lesions was determined by interviewing the athletes about their history of knee sprain, as well as by subjective evaluation and physical examination using the method recommended by the International Knee Documentation Committee (IKDC 2000). Among male soccer players, 16 (32%) have mentioned knee sprain, being 14 (28%) unilateral and 2 (4%) bilateral. Among females, 11 (23%) have mentioned knee sprain, being 9 (19%) unilateral and 2 (4%) bilateral. Ten (63%) male athletes

with knee sprain presented ligament or meniscus lesions, seven of which have been submitted to surgery (6 meniscectomies and 2 anterior cruciate ligament reconstructions). We did not find knee lesions among female soccer players examined. Male and female athletes returned to their activities after treatment in an average time of about 3.5 months. Among the male athletes, the average time of recovery was nearly 3 times longer in those who suffered ligament or meniscus lesions. The medium score of the IKDC 2000 subjective form was 95 points for male and 96 points for female athletes.

Keywords: Soccer/injuries, Knee injuries, Athletic injuries.

INTRODUCTION

The practice of competition sports has increased during the 20th Century, beginning with the Modern Olympic Games in Athens, Greece, in the year of 1896. Populations from many countries have been encouraged to show their sports performances and, thus, to pursue superiority. Many sports were created and developed, and some reached a fantastic level of popularity, among them, we can mention soccer, which is among the most practiced sports by both genders in different age groups. The Fédération Internationale de Football Association – FIFA gathers 203 member countries and approximately 200 million players, among them 40 million women⁽¹⁾.

The increase in soccer activities has produced an increase on the number of severe trauma-related injuries. The knee, because of its joint condition highly required and exposed to traumas, is frequently injured, being the anterior cruciate ligament rupture one of the most common injuries. The natural evolution of ligament injuries may affect the competitive sports practice and the correct diagnosis and treatments for these injuries can restore the previous activity levels on athletes. We know that men and women present different incidence rates of anterior cruciate ligament (ACL) injuries within the same sports, but there isn't a convincing explanation for that yet⁽²⁾.

Manaus is the biggest city in the North Region of Brazil, with 1.4 million people, according to data from the Brazilian Institute of Geography and Statistics. We didn't find epidemiological data in literature on knee injuries in this population, and there are no organized records in hospitals and clubs serving as a reference to establish its frequency as well.

This study aims to investigate the occurrence of knee sprains

and resulting lesions in soccer players from professional teams in Amazonas state, including both genders in the city of Manaus, upon physical test and interview, with the following specific objectives:

- 1) Determine knee sprains and injuries rate in the athletes;
- 2) Evaluate athletes' knees upon physical tests and subjective protocol based on the International Knee Documentation Committee – IKDC 2000;
- 3) Check the existence of differences among athletes of both genders.

MATERIALS AND METHODS

The study population was formed by professional soccer players (both genders), in the city of Manaus, Amazonas state, all registered at the Federação Amazonense de Futebol (FAF). According to FAF, in 2001, there were four professional soccer teams in Manaus for males and eight amateur beach soccer teams for females, but no professional teams for females. Two male teams, meaning 50% of the existent teams, and three female teams, that is, 37.5% of the existing teams in the city accepted to participate in the study. All athletes were interviewed and examined by the author during the period of November 01 – 30, 2001.

At first, an interview was conducted using open and closed questions about general data regarding ID, such as name, birth date, gender, current age, weight, height, and address, followed by sportive information, such as dominant side, time of sports practice, position in game, and questions about previous knee sprains and development of those sprains regarding affected side, if occurred during a game or training session, which the injury mechanism was, withdrawal time, if required medical treatment and which

Study conducted by the Knee Group, Department of Orthopaedics and Traumatology of the Medical Sciences College, Santa Casa de São Paulo. Department of Orthopaedics and Traumatology, Federal University of Amazonas.

Correspondences to: Av. Rio Negro 194 apto 802 – Veivalves, Manaus, AM – CEP: 6903-040 – E-mail: estewien@uol.com.br

1 – Master in Orthopaedics and Traumatology, Medical Sciences College, Santa Casa de São Paulo, and Professor at the Federal University of Amazonas.

2 – Associate Professor, Head of the Department of Orthopaedics and Traumatology at the Medical Sciences College, Santa Casa de São Paulo, "Pavilhão Ferdinando Simonsen".

Received in: 04/07/04; approved in: 05/05/05

kind of treatment was given. Interviewed individuals mentioning previous sprains were asked to answer to 10 questions translated from English about the subjective evaluation of the knee, according to protocol IKDC 2000 (International Knee Documentation Committee, 2000), with scores from 0 to 100⁽³⁾.

Physical tests on knee were performed by the IKDC 2000 method, with post-operative evaluation questions being removed: compartments evaluation, graft removal site evaluation, radiographic findings evaluation and functional test. The following variants were analyzed: laxity, alignment, patellar position and dislocation, range of motion, joint stroke, passive motion deficit and ligament examination⁽³⁾.

The author got a verbal authorization from the board of directors of each club to perform the physical tests on the knees of soccer athletes participating in the study. The author got a verbal authorization for physical examination from each athlete.

RESULTS

A total number of 97 athletes have been interviewed and examined, from which 50 were males and 47 females. The 50 soccer players belonged to Nacional Futebol Clube and to the São Raimundo Futebol Clube. Female soccer players came from the Estrela do Vale Futebol Clube, Compensa Futebol Clube, and Vasco Futebol Clube. All interviews and tests were performed during the month of November 2001, comprehending 100% of the male players and 88% of the female players from the teams addressed. Female players who refused to be interviewed were excluded.

Male players' ages ranged from 19 to 36 years old, with an average of 26.7 years old, and female players' ages ranged 13 – 39 years old, with an average of 23.5 years old. Weight averages were 69.8 kg for men and 59.3 kg for women. Height averages were 169.0 and 166.5 cm for males and females, respectively. Sports practice time ranged from 36 to 300 months for males, with an average of 154 months, and between 24 and 252 months for females, with an average of 113 months. Among male players, 42 (84%) had a dominant right leg, and 8 (16%) had a dominant left leg, and, among the female players, 39 (83%) had a dominant right leg and 8 (17%) had a dominant left leg.

Main data gathered from the interview, subjective evaluation and physical tests of the athletes with history of previous knee sprains are shown on Tables 1 and 2.

Among the 50 male soccer players, 16 (32%) had mentioned knee sprain, being 14 (28%) unilateral and 2 (4%) bilateral. Among the female soccer players, 11 (23%) had mentioned knee sprains, being 9 (19%) unilateral and 2 (4%) bilateral (Tables 3, 4). It is

important to highlight that each sprain episode studied occurred in a different moment, even in patients with bilateral sprain history. Thus, we considered a total number of 18 knees studied in men, and 13 knees studied in women on the tables that analyze data regarding that sprained knee (Tables 5, 7, 8, 9, 10, 11, 12 and Charts 1, 2). On Tables 1, 2, 6, 14, 16, which analyzed data regarding athletes with sprains, we used a total of 16 for males and 11 for females. The average age of male players at the time of sprain was 24 years old, while average age for female players was 23 years old.

Male athletes counted on good infrastructure conditions for training and healthcare, such as training fields, gym room, and a medical department. Female teams didn't count on a proprietary place or a medical department, so they had to train in a public field and look for healthcare by themselves.

Sixteen (32%) male athletes and 11 (23.4%) female athletes presented with knee sprain history (Table 3).

The majority of the athletes presented unilateral sprain history, being 14 (88%) males and 9 (82%) females (Table 4).

We noticed that most of the affected knees among men is the left knee (56%), while among women, the right knee is the most affected (69%) (Table 5).

The majority of the athletes with sprains history played at the mid-field positions (19.5%), defense (29.5%) and forward (22%) (Table 6).

We noticed that 50% of male athletes presented sprains between 23 – 27 years old, while female athletes had a bimodal distribution of 38% occurred within the period of 13 – 17 years old, and 28 – 31 years old (Table 7).

Forty-five per cent of men presented a soccer practice time ranging from 5 to 8 years, while 47% of women reached up to 4 years of practice (Table 8).

We noticed that the majority of injuries occur during games (Table 9).

We observed that, among men, there is no prevalence of direct or indirect trauma mechanism, while for women there was a prevalence (62%) of sprains by indirect mechanism, although statistically not significant (Table 10).

The majority of men (72%) and women (62%) were withdrawn from training sessions and games for a period superior to a month after the knee sprain (Table 11).

We saw that, among men, conservative treatment was performed in 10 (56%) knees, while surgical treatment was provided in 8 (44%) knees. Among women, conservative treatment was given to 11 (85%), and no treatment was given to 2 knees (15%) (Table 12).

We noticed that from the 16 male athletes with sprain history, seven (44%) have been operated, being six unilaterally

Athlete	Age (years)	Affected side	Trauma mechanism	Trauma site	Injury/ Surgery Date	Resumed activities (months)	Subjective evaluation (score)
01	25	Left	Indirect	Game	----	1	100
02	26	Left	Direct	Train.	Medial opening	3	93
03	25	Left	Direct	Game	----	4	100
04	30	Left	Direct	Game	Meniscectomy June/1993	2	100
05	28	Left	Direct	Game	----	2	90
06	31	Right	Direct	Game	----	1	89
		Left	Indirect	Game	Meniscectomy April/1993	7	94
07	35	Right	Indirect	Game	Posterior Drawer	1	100
08	36	Right	Direct	Game	----	1	100
09	24	Left	Direct	Game	Meniscectomy December/2000	2	93
10	30	Right	Direct	Game	ACL* October/2000	9	100
11	31	Right	Indirect	Train.	Meniscectomy January/1990	6	99
12	26	Right	Indirect	Game	ACL* January /1993	9	99
		Left	Indirect	Train.	Meniscectomy September/2001	1	88
13	22	Left	Direct	Game	Meniscectomy March/2000	4	95
14	27	Right	Indirect	Train.	----	1	99
15	22	Left	Indirect	Train.	Medial opening	6	75
16	27	Right	Indirect	Train.	----	3	100

Table 1. Distribution of the main data for male athletes with sprains according to the questions of forms 1, 2, and 3.

and one bilaterally; and, from the 8 knees submitted to surgery, there were six (75%) meniscectomies and two (25%) anterior cruciate ligament reconstruction with patellar tendon. Physical ligament examination of the operated athletes did not present changes.

From the athletes who had already suffered knee sprains, three males presented ligament changes. Two of them presented the medial aperture test from 3 to 5mm, which is considered as close to normal, according to the IKDC 2000, the third presented a posterior drawer test of 6 – 10mm, considered as abnormal, according to the IKDC 2000. One of the athletes with changed medial aperture test presented an injury on medial meniscus, according to nuclear magnetic resonance imaging test performed afterwards.

We found a total number of ten (63%) male athletes with sprain history presenting ligamentous or meniscal injuries.

Time to resume activities ranged from 1 to 9 months for males, with an average of 3.5 months, and from 1 to 9 months for female athletes, with an average of 3.7 months (Chart 1). Average time to resume sports activities among athletes with ligamentous or meniscal injuries was 4.5 months, while players without lesions resumed activities within 1.8 month.

Subjective IKDC scores ranged from 75 to 100 for males, with an average of 95, and from 82 and 100 for females, with average of 96. (Chart 2).

Forty-five (90%) men were considered as normal regarding generalized joint laxity, while women were divided into 24 (51%) considered as normal and 23 (49%) considered as loose (Table 13).

Among male athletes with sprain history, 14 (88%) were considered as normal regarding generalized joint laxity, while 7 (63%) women with sprain history were considered as loose (Table 14).

We noticed that men are divided into 38 (76%) obviously varus and 12 (24%) with an alignment considered as normal, while women are divided into 29 (62%) athletes with alignment considered as normal, and 18 (38%) obviously varus (Table 15).

Athlete	Age (years)	Affected side	Trauma Mechanism	Trauma site	Injury/Surgery Date	Resumed activities (months)	Subjective Evaluation (score)
01	29	Right	Direct	Train.	----	9	100
02	19	Right	Direct	Train.	----	1	100
03	33	Right	Direct	Game	----	1	100
04	28	Right	Indirect	Game	----	9	100
05	23	Right	Indirect	Game	----	1	99
06	30	Right	Indirect	Train.	----	1	82
		Left	Indirect	Game	----	3	100
07	18	Left	Indirect	Game	----	1	86
08	33	Right	Direct	Game	----	6	99
09	17	Right	Direct	Train.	----	4	100
		Left	Direct	Train.	----	4	100
10	33	Left	Direct	Game	----	6	81
11	31	Right	Indirect	Game	----	2	100

Table 2 - Distribution of the main data for female athletes with sprains according to questions on forms 1, 2, and 3.

Sprain history	Male		Female		Total	
	n	%	n	%	n	%
Without	34	68	36	76.6	70	72.2
With	16	32	11	23.4	27	27.8
Total	50	100	47	100	97	100

Table 3. Distribution of athletes with and without sprain history, according to gender.

Uni- and bilateral sprain	Male		Female		Total	
	n	%	n	%	n	%
Unilateral	14	88	9	82	23	85
Bilateral	2	12	2	18	4	15
Total	16	100	11	100	27	100

P value = 0.5453

By using the Fisher's exact test (with expected values below 5 units), we can see that there is no correlation between genders and sprain.

Table 4. Distribution of athletes with unilateral and bilateral sprain, according to gender.

Affected side of knee	Male		Female		Total	
	n	%	n	%	n	%
Right	8	44	9	69	17	55
Left	10	56	4	31	14	45
Total	18	100	13	100	31	100

$\chi^2 = 1.87$

P value = 0.1712

By using Pearson's chi-square Test, we can see that there is no correlation between gender and affected side of knee.

Table 5. Distribution of the knees of athletes with sprains by affected side, according to gender.

Position	Male		Female		Total	
	n	%	n	%	n	%
Forward	5	31	1	9.0	6	22.0
Right/Left field	0	0	1	9.0	1	4.0
Mid field	4	25	4	36.5	8	29.5
Defense	4	25	4	36.5	8	29.5
Goalkeeper	3	19	1	9.0	4	15.0
Total	16	100	11	100	27	100

*In this table, the statistics of Fisher's exact test could not be applied because there are many expected values below 5 units. The same happens in Tables 7, 8, 11 and 12.

Table 6. Distribution of athletes with sprain history by game positions, according to gender*.

We noticed that male athletes with sprain history are divided into 10 (63%) obviously varus, and 6 (37%) considered as normal, while female athletes are divided into 11 (91%) considered as normal, and 1 (9%) obviously varus (Table 16).

We found all athletes with the patella in a normal and centralized position. Only one athlete presented a deficit of knee range of motion between -5 and 130 degrees, bilaterally. No male or female athlete presented joint stroke. Among the athletes who hadn't suffered knee sprains, none presented ligamentous laxity upon manual examination, according to the sequence of ligament physical test of the IKDC.

DISCUSSION

Many authors describe lower limbs as the most injured region during soccer playing, being the knee among the most affected joints(4-9). According to Ekstrand and Gillquist⁽⁷⁾, the knee sprain is one of the most common traumas. The sprain, whether caused by a direct or indirect mechanism, may cause meniscal, chondral and ligament lesions, among them the ACL lesion. Knee ligament injuries modify individuals' sports performance, according to what was noticed by Rezende et al.⁽¹⁰⁾.

In this study, we compared soccer players from both genders, in the city of Manaus, Amazonas – Brazil. By this time, we noticed that infrastructure differences between both groups were notorious. Male athletes trained in a proper place, counting on a medical department. Female teams trained in a public field and didn't count on a proper medical department, which required them to look for healthcare by themselves.

Regarding physical characteristics of weight and height, both groups showed expected values, being male gender approximately 2.5cm higher and 10 kg heavier than the female group. We agree with Ejnisman and Cohen⁽¹⁾ that soccer is a sports requiring a lot of physical contact, and that, the higher the values for weight and height, the higher the levels of contact among players. We can,

then, assume that there is a higher level of physical contact among male soccer players.

Among male players, 16 (32%) had mentioned knee sprains, with 14 (28%) presenting unilateral sprain and two (4%) bilateral sprains; we considered 18 among 100 knees of male athletes, meaning that 18% of the knees of male athletes suffered sprains (Tables 3, 4). Among female players, 11 (23%) had mentioned knee sprains, with nine (19%) presenting unilateral sprains and two (4%) presenting bilateral sprains; we considered 13 among 94 knees, meaning that 14 % of the knees of female athletes had suffered sprains (Tables 3, 4). We can state that knee sprains were very common in the studied population, since around one third of the male players and almost one fourth of the female players had mentioned the injury. Engstrom et al.⁽⁶⁾ found 7(17%) female players with ligament and meniscus injuries in two female soccer teams in Sweden, within a period of one year. In our environment, Carazzato et al.⁽⁴⁾ found a rate of 13% of ligament and meniscus injuries in male soccer within 20 years of activities in a club. Hoy et al.⁽¹¹⁾ concluded that competitive sports injuries are more severe, both for males and females.

Among the soccer players with knee sprains, seven (44%) were submitted to surgery, from which six unilaterally and one bilaterally. Surgeries performed were six meniscectomies and two ACL reconstructions with patellar tendon. All athletes submitted to surgery were in full sportive conditions in their teams by the time the research was conducted. None presented deficit in range of motion, joint stroke or ligament laxity at the clinical test. Players with right leg dominance were found in both genders with a frequency of 83%. Nevertheless, the same frequency was not seen in athletes who suffered sprains, dropping to values of 69% for females and only 44% for males (Table 5). This phenomenon was not yet explained and there are no data for comparison.

Among males, the forwarders were the most affected athletes (31% of the sprains), while among females,

Athletes' ages by the time of injury	Male		Female		Total	
	n	%	n	%	n	%
13 - 17 years	0	0	5	38	5	16
18 - 22 years	7	39	1	8	8	26
23 - 27 years	9	50	2	16	11	36
28 - 31 years	2	11	5	38	7	22
Total	18	100	13	100	31	100

Table 7. Distribution of knees of athletes with sprains by age at the time of injury, according to gender.

Time of Soccer Practice	Male		Female		Total	
	n	%	n	%	n	%
Up to 4 years	3	16	6	47	9	29.0
5 - 8 years	8	45	0	0	8	25.8
9 - 12 years	6	33	3	23	9	29.0
13 - 16 years	1	6	2	15	3	9.7
Above 17 years	0	0	2	15	2	6.5
Total	18	10	13	10	31	100

Table 8. Distribution of knees of athletes with sprains by time of soccer practice, according to gender.

Site of Occurrence	Male		Female		Total	
	n	%	n	%	n	%
Game	12	67	9	69	21	68
Training	6	33	4	31	10	32
Total	18	100	13	100	31	100

$\chi^2 = 0.02$

P value = 0.8802

By using the Pearson's Chi-Square Test, we can see that there is no correlation between gender and site of occurrence.

Table 9. Distribution of knees of athletes with sprains by site of occurrence, according to gender.

Trauma mechanism	Male		Female		Total	
	n	%	n	%	n	%
Direct	9	50	8	62	17	55
Indirect	9	50	5	38	14	45
Total	18	100	13	100	31	100

$\chi^2 = 0.41$

P value = 0.5241

By using the Pearson's Chi-Square Test, we can see that there is no correlation between gender and trauma mechanism.

Table 10. Distribution of knees of athletes with sprain history by trauma mechanism, according to gender.

Withdrawal time	Male		Female		Total	
	n	%	n	%	n	%
Less than one week	0	0	1	7	1	3
One week - one month	5	28	4	31	9	29
More than one month	13	72	8	62	21	68
Total	18	100	13	100	31	100

Table 11. Distribution of knees of athletes with sprain history by withdrawal time, according to gender.

mid-fielders and defense players were the most affected ones (36.5% each) (Table 6). Engstrom et al.⁽⁶⁾ did not find any difference in game position and number of sports injuries among women. Pedrinelli⁽⁹⁾ didn't find any significant difference between game position and number of sports-related injuries among men. Bjordal et al.⁽¹²⁾ found a significantly higher ACL injury risk among male and female forward players. Cohen et al.⁽⁵⁾ concluded that the higher incidence of injuries in male soccer occurred in mid-field and forward players. We noticed that there was no agreement regarding game position and number of injuries in literature review. We agree with Ejnisman and Cohen⁽¹⁾ that soccer is going through a tactic change, based on a strong physical conditioning and an aggressive watching, producing a higher level of contact among players in different positions. We believe that the injury risk does not depend on game position.

Approximately half of the sprains occurred in men after 5 to 8 years of soccer practice, and in women with up to 4 years of practice (Table 8). Hoy et al.⁽¹¹⁾ found the average ages for sports-related injuries in soccer for men and women, respectively, of 22 and 19 years old. Sprain is a mechanism potentially generating such injuries, and we saw a trend that is still not explained of sprain precocity and of ACL injury in female athletes. The distribution of sprains according to age showed that the most affected age group was within 18 - 27 years old for men, with 89% of the cases. For women, there was a bimodal distribution of 38% in the age group of 13 - 17 years old and 28 - 31 years old (Table 7). Pedrinelli⁽⁹⁾ found in a male professional soccer team that the prevalence of sport-related injuries was at the age group of 25 - 28 years old.

Our study shows that knee sprains occurred more frequently during games than during training sessions, which means a ratio of 2:1 for both genders (Table 9). Engstrom et al.⁽⁶⁾ determined an incidence of sports-related injuries during games on the order of 24/1000 hours, while during training sessions were 7/1000 hours.

Concerning trauma mechanism, we found an equal distribution of 50% for direct and indirect mechanism among men, and 62% and 38% for women, respectively, being considered as a not statistically significant difference (Table 10). To date, the studies performed are different from each other regarding injuries mechanism. Ekstrand and Gillquist⁽⁷⁾ found 61% of traumatic injuries on the knee by direct mechanism in female athletes and Pedrinelli⁽⁹⁾ concluded that sports-related injuries by indirect mechanism are the most common ones; Arendt and Dick⁽²⁾ noted that women were twice as likely to have an ACL injury resulting from a direct trauma, and three times more likely to have an ACL injury resulting from indirect trauma than men, while Cohen et al.⁽⁵⁾ concluded that injuries by indirect mechanism were more common in male soccer players.

Regarding the time of withdrawal from physical activity after the sprain, the majority of the male and female players remained off games and training for more than a month (72% and 62%) (Table 11 and Chart 1). Men presented an average time to resume physical activities of 3.5 months, while women presented an average time of 3.7 months. Luthje et al.⁽¹³⁾ noted that knee injuries were the most common cause of surgery in male players, with a mean time to resume physical activities of 3 months. The importance of knee injuries in the withdrawal of athletes was demonstrated in our study and in other mentioned authors' studies and reveals the impact on such athletes' lives.

The subjective IKDC 2000 showed high scores for most of the athletes (Tables 1, 2; Chart 2), which reflects the good condition of examined knees. There was only one male athlete with a subjective IKDC of 75 points; this one presented with a medial meniscus injury at clinical test, confirmed by a magnetic nuclear resonance imaging test. Recently, Irrgang JJ et al.⁽³⁾ concluded that the subjective IKDC 2000 is a trustful and valid instrument for measuring symptoms, function and sports-related activities in individuals of both genders within different age groups, with different

Kind of Treatment	Male		Female		Total	
	n	%	n	%	n	%
Conservative	10	56	11	85	21	68
Surgical	8	44	0	0	8	26
None	0	0	2	15	2	6
Total	18	100	13	100	31	100

Table 12. Distribution of knees of athletes with sprains by kind of treatment, according to gender.

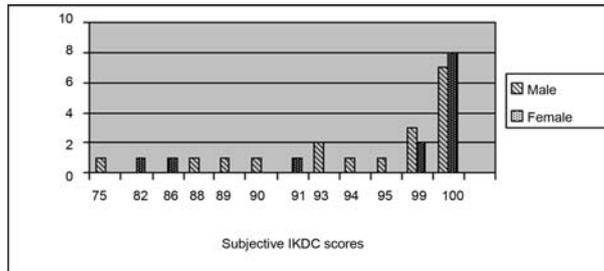


Chart 1. Distribution of knees of athletes with sprains by subjective IKDC scores.

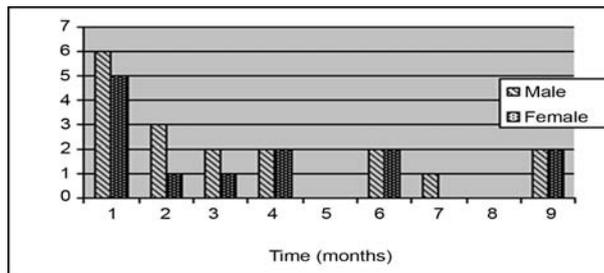


Chart 2. Distribution of knees of athletes with sprain history by recovery time.

Laxity	Male		Female		Total	
	n	%	n	%	n	%
Normal	45	90	24	51	69	71
Loose	5	10	23	49	28	29
Stiff	0	0	0	0	0	0
Total	50	100	47	100	97	100

* $\chi^2 = 17.89$

P value = 0.0001

By using the Pearson's Chi-Square Test, we can see that there is a correlation between gender and athletes' generalized joint laxity.

Table 13. Distribution of athletes by generalized joint laxity, according to gender.

Laxity	Male		Female		Total	
	n	%	n	%	n	%
Normal	14	88	4	37	18	66
Loose	2	12	7	63	9	34
Stiff	0	0	0	0	0	0
Total	16	100	11	100	27	100

* P value = 0.0090

By Fisher's exact test (with expected values below 5 units), we can see that there is a correlation between gender and sprain by generalized joint laxity.

Table 14. Distribution of athletes with sprain history, by generalized joint laxity, according to gender.

knee changes. This successful experience has led us to use it in this study. We believe that the use of an international protocol for subjective evaluation of the knee could be improved. In our environment, activities such as ski, gardening and even tennis are uncommon. Instead, similar activities should be introduced into IKDC 2000 in order to enable its international spreading.

Generalized joint laxity was more prevalent in female athletes (49%), while 90% of men maintained a normal pattern (Table 13). This fact is explained by female's condition of better joint flexibility^(14,15). When athletes with knee sprain history were analyzed, we noticed that the majority of men (88%) presented normal conditions, while the majority of women (63%) presented laxity (Table 14). We agree with the statements by Rozzi et al.⁽¹⁵⁾ concerning women's apparent adjustment of compensatory mechanisms of increasing muscle flexing activity of the knee in order to achieve a better stability.

When the group with sprain history was studied, we saw that the majority of men (63%) present varus knee and the majority of women (91%) present normal alignment. According to Fu and Stone⁽¹⁴⁾ women presented a greater femoral anteversion, an increased Q angle, a higher level of flexibility, less muscular mass, a narrower femoral intercondyle, a trend to physiological genuvalgus and to a greater inward or neutral rotation of the tibia.

Among the female players we found only those who had been submitted to conservative treatment (Table 12). We believe that, if a medical department existed for the teams, we would find female players who would have been submitted to surgery and then returned to sports activities. Thus, it would be reasonable to assume that we would have a higher number of female patients with knee sprains history, if they were included in professional teams.

In addition to patients submitted to surgery, there were three male players presenting ligament changes by the time of physical tests. In the first patient, a physical test compatible with medial meniscus

injury was found, which was corroborated by nuclear magnetic resonance imaging. Two of them showed a medial aperture test of 3 to 5 mm, which is considered as close to normal, according to IKDC 2000. The third athlete showed a posterior drawer test of 6 to 10 mm, which is considered as abnormal, according to IKDC 2000. All of them belonged to the main team by the time of the test and presented subjective IKDC 2000 scores of 75, 93 and 100, respectively.

None of the female players presented changes on the ligament physical test. They were in average 3.2 years old younger than males, and presented 3.4 years less than men regarding soccer practice, showing, therefore, a shorter time of sports performance. Those data suggest that many female players quit soccer earlier than male players, probably, in part, because of injuries. The two male athletes who have been submitted to surgery for anterior cruciate ligament reconstruction did not present changes on ligament physical test and presented scores of 100 and 99 on the subjective IKDC.

The correlation of ligament, chondral and meniscal injuries during the acute phase of knee sprain is frequent and should be considered for treatment indication. When the patient develops with knee instability, we know that an association usually exists to meniscal and chondral degenerative injuries. The fact that those degenerative injuries are worsened with time is well established. Thus, it is important to know that the sooner they occur, the higher the possibility of finding potentially disabling sequels in those athletes. Thus, investigations on the epidemiology and knee sprain mechanism should be encouraged in order to try to minimize or avoid its disastrous consequences.

REFERENCES

1. Ejnisman B, Cohen M. Futebol. In: Cohen M, Abdalla R. eds. Lesões nos esportes. Diagnóstico, prevenção e tratamento. Rio de Janeiro: Revinter; 2003. p.671-4.
2. Arendt E, Dick R. Knee injury patterns among men and women in collegiate basketball and soccer. NCAA data and review of literature. Am J Sports Med 1995; 23:694-701.
3. Irrgang JJ, Anderson AF, Boland AL, Harner CD, Kurosaka M, Neyret P et al. Development and validation of the International Knee Documentation Committee Subjective Knee Form. Am J Sports Med 2001; 29:600-13.
4. Carazzato JG, Campos LAN, Carazzato SG. Incidência de lesões traumáticas em atletas competitivos de dez tipos de modalidade esportiva. Trabalho individual de duas décadas de especialista em Medicina Esportiva. Rev Bras Ortop 1992; 27:745-58.
5. Cohen M, Abdalla RJ, Ejnisman B, Amaro JT. Lesões ortopédicas no futebol. Rev Bras Ortop 1997; 32:940-4.
6. Engstrom B, Johansson C, Tornkvist H. Soccer injuries among elite female players. Am J Sports Med 1991; 19:372-5.
7. Ekstrand J, Gillquist J. Soccer injuries and their mechanisms: a prospective study. Med Sci Sports Exerc 1983; 15:267-70.
8. Maffulli N, Chan KM, Miao M, Fu FH, Kurosaka M. Athletic knee injuries. Similarities and differences between Asian and Western experience. Clin Orthop 1996; 323:98-105.

9. Pedrinelli A. Incidência de lesões traumáticas em atletas de futebol. [Dissertação]. São Paulo: Faculdade de Medicina da Universidade de São Paulo; 1994.
10. Rezende UM, Camanho GL, Hernandez AJ. Alteração da atividade esportiva nas instabilidades crônicas do joelho. Rev Bras Ortop 1993; 28:725-30.
11. Hoy K, Lindblad BE, Terkelsen CJ, Helleland HE, Terkelsen CJ. European soccer injuries: a prospective epidemiologic and socioeconomic study. Am J Sports Med 20: 318-22, 1992.
12. Bjordal JM, Arnly F, Hannestad B, Strand T. Epidemiology of anterior cruciate ligament injuries in soccer. Am J Sports Med 1997; 25:341-5.
13. Luthje P, Nurmi I, Kataja M, Belt E, Helenius P, Kaukonen JP et al. Epidemiology and traumatology of injuries in elite soccer: a prospective study in Finland. Scand J Med Sci Sports 1996; 6:180-5.
14. Fu FH, Stone DA. Sports Injuries: mechanism, prevention and treatment. Baltimore: Williams & Wilkins; 1994.
15. Rozzi SL, Lephart SM, Gear WS, Fu FH. Knee joint laxity and neuromuscular characteristics of male and female soccer and basketball players. Am J Sports Med 1999; 27:312-9.

Lower limbs alignment	Male		Female		Total	
	n	%	n	%	n	%
Obviously varus	38	76	18	38	56	58
Normal	12	24	29	62	41	42
Obviously valgus	0	0	0	0	0	0
Total	50	100	47	100	97	100

*x² = 14.11

P value = 0.0002

By using the Pearson's Chi-Square test we can see that there is a correlation between gender and athletes' lower limbs alignment.

Table 15. Distribution of athletes, regarding lower limbs alignment, according to gender.

Lower limbs alignment	Male		Female		Total	
	n	%	n	%	n	%
Obviously varus	10	63	1	9	11	40
Normal	6	37	10	91	16	60
Obviously valgus	0	0	0	0	0	0
Total	16	100	11	100	27	100

*P value = 0.0047

By using the Fisher's exact test (with expected values below 5 units), we can see that there is a correlation between gender and sprain history by athletes' lower limbs alignment.

Table 16. Distribution of athletes with sprain history, regarding lower limbs alignment, according to gender.

CONCLUSION

The results presented and discussed in this study enable the following conclusions:

1) Knee sprains happened at a ratio of about one third for male players (32%), and of approximately one fourth (23%) for female players in the soccer teams investigated in the city of Manaus; bilateral knee sprain occurred in 4% of the athletes of both genders.

2) Most of male athletes with sprain history (63%) presented with ligament or meniscus injuries; only 44% have been submitted to surgical procedures, with a three-fold higher incidence of meniscectomies when compared to anterior cruciate ligament reconstructions.

3) After sprain treatment, the mean time for resuming sports-related activities was about 3.5 months for both genders, with players suffering ligament or meniscus injuries presenting a mean return time 3 times longer.

4) Approximately half of the sprains occurred in younger female players and in those with the shortest times of soccer playing; concerning professional male players, the majority of sprains (84%) occurred after at least 5 years of soccer practice.

5) The presence of generalized joint laxity was significantly higher among female players than among male soccer players, reaching 63% for athletes with sprains.

ACKNOWLEDGEMENT

We acknowledge the Publication Support Nucleus of the Medical Sciences College, Santa Casa de São Paulo (NAP-SC) for the technical-scientific support to the publication of this manuscript.