Epidemiologic analysis of injuries occurred during the 15th Brazilian Indoor Soccer (Futsal) Sub20 Team Selection Championship

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ABSTRACT

Introduction: Several authors have investigated the incidence of injuries occurred in the outdoor soccer game. However, there are only few works analyzing injuries occurred in the indoor soccer game (futsal). The purpose of this study was to analyze the incidence, circumstances, and characteristics of injuries recorded in the indoor soccer during the 15th Brazilian Sub20 Futsal Championship. **Methods:** Physiotherapists and doctors of every team selection participating in the 15th Brazilian Sub20 Futsal Championship answered a questionnaire with the purpose to investigate the occurrence of injuries during the games. The answering rate was 100%. **Results:** 32 total injuries were recorded along 23 games, with a 1.39 injury incidence per game, or 208.6 injuries per 1,000/game. Approximately 1 to 3 injuries per game resulted in removal of players from gaming or training. Contact injuries were predominant in 65.62% (21 out of 32 injuries), and most of these injuries did not result in removal of the players. **Conclusions:** The present study observed that the injury incidence during the 15th Brazilian Sub20 Futsal Championship was similar to the incidence during the Indoor Soccer tournaments, but higher than those found in the outdoor soccer tournaments, characterizing the specificity of the sports. Nevertheless, circumstances and characteristics are similar among them, mainly due to the similar demand of the sports.

Keywords: Indoor soccer. Futsal. Outdoor soccer. Injury. Incidence rate. Tournament.

INTRODUCTION

Indoor Soccer is an ascending sport that has attracted more and more followers all over the world. In Brazil, it is one of the most spread sport, played by more than twelve million Brazilian people, according to the Futsal Brazilian Confederation (CBFS)[1].

Keller *et al.*[2] assert that the soccer game is responsible by the highest number of sportive injuries in the world. It is estimated that these injuries are responsible by 50 to 60% of the sportive injuries in Europe, and 3.5 to 10% of the physical traumas treated in the European hospitals are caused by the soccer game[2-4].

Several studies have analyzed the incidence and risk factors for injuries in the soccer game[4-22], but there are few articles discussing the indoor soccer[3,23,24], and only one study comprising the Indoor Soccer[13]. According to Junge *et al.*[13] in a study performed during the International Soccer Federation (FIFA), and in the 1998 and 2001 Olympic Games, it was observed a 191 injury incidence per 1,000 gaming hours in the 2000 Guatemala World Championship of Indoor Soccer, an approximately two times higher rate found by them in the outdoor soccer tournaments (92 injuries per 1,000 game hours).

Such difference can be attributed to the nature of the game, associated to the high speed of the movement, the lower size of the court, and differences on the floor, resulting in a higher amount of collisions and sprains, respectively[13]. Added to the own characteristics of the sport, the Indoor Soccer is one of the most practiced sportive modalities in the world, and this fact requires systematic investigations as to the incidence of injuries.

Definition of the injury

Several epidemiologic studies define differently the term sportive injuries, thus making difficult to make a comparison between these studies[2,11,23,25-28]. Some studies define injuries as those treated by the medical department and requiring hospitalization[8]. These sportive injuries were recorded in the insurance policy, and it was observed that the higher percentage among them was severe, and predominantly acute. Besides, low severity injuries or those caused by the overuse were not recorded, and this was called the "iceberg peak phenomenon"[28].

More recent studies have defined the injury as an event that would have as consequence the player being removed for a given period of time from the games or trainings[9,17,24,29,32]. According to Junge and Dvorak[11], such definition is not completely accurate. First, its application depends on the training and gaming frequency. Second, injured athletes can have a moderate participation in the trainings through a change in their exercising program. Third, the participation in the training and games depends on other factors, such as availability of an adequate treatment and importance of the game.

The National Athletic Injuries Recording System in the United States (NAIRS) defines injury as an event that limits the athlete to participate in games or in the training for at least one day after the occurrence. This definition is more accurate, but it also does not solve all the aforementioned difficulties[28].

The definition of the European Council requires that the injury has at least one of the following consequences: 1) reduction in the amount or level of the sportive activity; 2) it requires medical assessment or treatment; 3) it has unfavorable social and economic effects. This present definition for the injury seems to be more comprising, but it has been less used[9,20].

Besides the definition of the sportive injury, another point that deserves to be mentioned is to define the severity of the injury. The severity of the injury has been defined by the endurance of the removal from the sportive practicing, and it is classified in three categories: mild (1 to 7 days), moderate (8 to 21 days), and severe (more than 21 removal days)[17,30-32]. Van Mechelen *et al.*[28] recommend that the severity of the sportive injuries is described based on six criteria: nature of the injury, endurance and type of the treatment, time of the sportive removal, time of the removal from the work, permanent damage, and cost.

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Ladeira[15] asserts that the epidemiologic studies are the first step to elaborate a preventive program. Physicians, therapists and physical educators must understand the incidence, risk factors and the mechanisms of the injury, in order to be able to combat its causes[2,33]. The authors of this article are not aware of epidemiologic studies on injuries occurred in Indoor Soccer in Brazil practitioners.

The purpose of this study was to make a prospective analysis on the incidence, circumstances and characteristics of the injuries occurred in the Indoor Soccer recorded during the 15th Brazilian Sub20 Selection Championship.

METHODS

The study was performed during the 15th Brazilian Sub20 Team Selection Championship, a tournament organized by the CBFS. It was studied one hundred and eighty 17 to 20 years old athletes representing ten State team selections.

Physicians, therapists or physical coaches of ten participating team selections answered a form (figure 1) with the purpose to investigate the occurrence of injuries occurred during the games. That form was adapted from a medical record performed by FIFA: Medical Assessment and Research Center (F-Marc)[13]. Whenever a player has been injured, the details of his life were recorded through an interview conducted by the main author of this research. After the end of the tournament, the author had regular telephone conversations to physiotherapists, coaches and/or athletes, in order to make a follow-up of the injuries' evolution.

In this study, an injury was defined as any commitment occurred during a game, regardless its consequences related to the subsequent removal from the games or training[13]. The injuries were recorded based on their circumstance (with or without contact), location, type and severity, and these data are presented on table 1. In this study, all data were descriptively presented.

This study was approved by the ethics committee of the Minas Gerais Pontifical Catholic University and the Arbitration Council of the 15th Brazilian Sub20 Team Selection Championship, and all volunteers participating in this study gave their consent to such participation.

Calculation of the incidence

The incidence for injuries was expressed as the amount of injuries per game and the amount of injuries per 1,000 gaming hours per athlete, according to prior studies[12,13]. The amount of gaming hours per athlete was calculated according to the following equation: 10 players x 40 minutes = 6.67 hours. The extra time and the reduction in the amount of athletes playing during the

Recorded injuries during the 15th Brazilian of the Sub20 Team Selection Championship, São Paulo, 2004

Team:_____Game:_____ x _____ Date: ___/___/___

Name of the responsible physician, physiotherapist or physical coach: _____

Phone/fax:_____ E-mail:_____

Please inform:
Every injury (overuse or trauma) occurred during the game, regardless its consequence related to the consequent removal from the game or training. Information reported will be used in medical researches, and it will be handled as confidential.

Athlete No.	Location		Diagnosis		Severity	Circumstance	
	Site of the injury	Code	Type of the injury	Code	Removal time (days)	With contact	Without contact

There was no injury during the game ____

For the definition of the site and severity of injuries see back page.

Code to the site, type, and severity of the injuries

Location of the injury

Trunk
1. Head and face
2. Columna cervicalis
3. Columna thoracic
4. Columna lumbar
5. Thorax
6. Abdomen
7. Pelvis/sac

Upper End
8. Shoulder
9. Arm
10. Elbow
11. Forearm
12. Wrist
13. Hand
14. Finger
15. Thumb

Lower End
16. Hip
17. Groin
18. Thigh
19. Knee
20. Leg
21. Ankle
22. Feet
23. Finger

Type of the Injury
1. Chock with loss of consciousness
2. Chock without loss of consciousness
3. Ligamentous injury with instability
4. Ligamentous injury without instability
5. Injury in the meniscus
6. Fracture
7. Luxation/subluxation
8. Muscular strain
9. Sprain
10. Contusion
11. Excoriation
12. Lombalgia/cervicalgia
13. Muscular fatigue
14. Bursitis
15. Tendinitis/tendinosis
16. Cortocontusion
17. Others

Severity of the injuries days
0 = 0 days
1 = 1 day
2 = 2 days
7 = 1 week
14 = 2 weeks
> 30 = more than 4 weeks

Fig. 1 *– Form for injury recording*

games were not considered, since none of the games required an extra time, and the exclusion of athletes was a rare event that lasted a short-time.

RESULTS

A total of 32 injuries were recorded during the 15th Brazilian Sub20 Team Selection Championship, with a 1.39 injuries/game incidence. The circumstances for the injuries were recorded by the occurrence or not of contact (direct or indirect trauma). The injuries with contact were predominant, with a 65.62% (21 out of 32 injuries) rate, and the major part of these injuries did not result in removal of athletes from the sportive activities. Complementary information on the incidence, circumstance, and characteristic of the injuries are found on table 1.

TABLE 1
Incidence and characteristics of injuries

Number of games	23
Answering index	23 (100%)
Number of recorded hours	153.4
Number of injuries	32
Injuries per game	1.39
Injuries per 1,000 hours	208.6
Circumstance	
With contact	21 (65.62%)
Without contact	11 (34.38%)
Time of the removal	
0 day	21 (65.62%)
1 day	5 (15.62%)
4 days	1 (3.13%)
> 1 week < 1 month	4 (12.5%)
> 1 month	1 (3.13%)
Injuries with removal	11 (34.38%)
Injuries per game	0.48
Injuries per 1,000 hours	71.7
Injured part of the body	
Head, face, neck	1 (3.13%)
Upper end, including shoulder	1 (3.13%)
Trunk	3 (9.37%)
Thigh	9 (28.12%)
Knee	4 (12.5%)
Ankle	8 (25%)
Ankle	6 (18.75%)
Type of injury	
Sprain	9 (28.12%)
Contusion	10 (31.25%)
Fracture	1 (3.13%)
Muscular strain	3 (9.37%)
Ligamentous injury with instability	1 (3.13%)
Tendinopathy	4 (12.5%)
Muscular fatigue	2 (6.25%)
Lombalgia/cervicalgia	3 (9.37%)
Others	1 (3.13%)

TABLE 2
Time of removal related to injuries with and without contact

Time of removal	Injuries without contact (n = 11) n (%)	Injuries with contact (n = 21) n (%)
With no removal	6 (55%)	15 (71%)
1-3 days	2 (18%)	3 (14%)
4-7 days	0 (0%)	1 (5%)
7-28 days	2 (18%)	2 (10%)
> 28 days	1 (9%)	0 (0%)

The rate of injuries resulting in the game or training removal was 0.48 injury/game, or 71.7 injuries/1,000 gaming hours. Significantly, injuries without contact (34.38%, 11 out of 32 injuries) resulted in removal of athletes from the sportive activities than contact injuries (65.62%; 21 out of 32 injuries). The severity (removal time) was higher for injuries without contact compared to injuries with contact (see details on table 2).

DISCUSSION

This study investigated the incidence and characteristics of injuries during the 15th Brazilian Sub20 Team Selection Championship. All the ten team selections participating in the tournament cooperated in this study answering an adapted F-MARC[13] questionnaire after the games, resulting in a 100% answering index. In this study, the injuries were defined as any commitment occurred during the games regardless its consequences as to the consequent removal from the games or training[13].

The use of a wide definition including "every injury (overuse and trauma) caused during the soccer game, regardless its consequence" avoids any problems associated to other restricted definitions[13]. It allows the assessment of chronic injuries through the assessment of the impact caused by the high incidence rate of mild and moderate contusions compared to fractures, for instance.

Besides of making available additional information (such as calculation of the length of time of the removal from the activity and treatment performed by a physician or therapist), allowing to express the incidence of injuries according to different definitions, thus allowing to make a comparison of the results related to other studies.

Another important factor is that such wider definition makes possible to minimize errors occurred during the data collection that is performed by different examiners from several professions (physicians, physiotherapists, physical educators, etc.) what might be one of the limiting factor to this type of study.

Several studies have demonstrated a great difference in the incidence rates of injuries recorded in the soccer game[2,11,23,25-28]. Junge and Dvorak[11] have attributed these differences to heterogeneous definitions, data collection methods, time of observation, type of the study, and characteristics of the sampling found in the works.

The definition of the injury as well as its severity are important aspects when recording sportive injuries, and they have been discussed by several authors[2,11,23,27,28]. Junge and Dvorak[11] assert that the definition of the injury must be based on the prevalence of the appropriate complaint to the soccer game, and the severity is not determined only by the endurance of the symptoms, but also by the damaged tissue, since small injuries and those "healed" using analgesia or medication are neglected, and the incidence rate of injuries may be underestimated.

The data collection system has also been aim for several discussions. Liendefeld *et al.*[3] assert that the adequate recording system must include components such as location, type and circumstance of the injury.

Junge and Dvorak[11] recommend that the exact calculation of the incidence of the injuries, as well as the amount of the game and training must be individually documented for each athlete. Besides, they assert that record of the sportive injury must be performed prospectively, since retrospective data have a limited value, and the prospective studies besides of assessing the incidence of injuries, can also identify the groups and risk factors.

In the present study, the incidence of injuries (208.6 injuries/1,000 game hours) was slightly higher than the incidence recorded by Junge *et al.*[13] during the 2000 Guatemala World of Indoor Soccer Championship (191 injuries/1,000 game hours). Such higher incidence may be explained by a technical and tactic fragility, as well as a lower muscular strength, resistance, coordination and skill found in young athletes. Modifications in the training system for young athletes, aiming the technique, ability, as well as the physical conditioning can minimize the incidence of sportive injuries[19].

It was not possible to assess injuries during the training, since in short tournaments like that, teams play daily games, and in the majority of cases, this makes unviable to train between competitions, and thus, our work was limited to assess only the incidence of injuries/gaming hours.

The incidence rate of injuries without contact was higher than the rates found in other tournaments[13], and 45% of these injuries resulted in removal from the games or training. Such high incidence rate of injuries without contact may be an indicator that athletes had not time enough to prepare themselves to all the tournament's demand, and/or there was no available recovering time from injuries along the competition.

The major part of the injuries (65.62%) was caused by direct contact, and the contusions and sprains were the most common type of injury along the tournament, and this result was similar to other studies[3,12,23,24]. We found a slightly higher sprain rate than those recorded by Junge *et al.*[12,13] in the 1998 and 2002 FIFA's soccer tournaments, as well as in the 2000 Olympic Games. This difference may be attributed to the rubber and more adherent floor of the Indoor Soccer's court, compared to the outdoor soccer's grass that predisposes athletes to a higher amount of sprains.

The location of the recorded injuries was similar to the ones found in other studies[3,4,10,12,13,15-17,19,21-23], predominantly affecting the ankle and knee's joints, and the thigh and leg's muscles. The disproportion between body's parts may be attributed to the higher demand imposed to the lower end in that sport[19].

CONCLUSION

The present study observed that the incidence, circumstance, and characteristics of the injuries occurred during the 15th Brazilian Sub20 Team Selections Championship are similar to those verified both in Indoor and outdoor soccer tournaments, characterizing the specificity of the sport. The analysis on the incidence and risk factors related to sportive injuries, as well as preventive program development are extremely important aiming to reduce injuries while practicing the sport.

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