PREVALENCE OF INJURIES IN FEMALE ATHLETES OF BRAZILIAN FUTSAL: A RETROSPECTIVE STUDY

LOCOMOTOR APPARATUS IN EXERCISE AND SPORTS

ORIGINAL ARTICLE

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ABSTRACT

Introduction: Futsal has become one of the most popular modalities in the international scenario. There are not many articles in the literature which report injuries in the female gender. Objective: The purpose of this study was to identify the prevalence of injuries in female athletes of Brazilian futsal. Methods: The sample corresponded to the athletes who participated in the National League of Futsal from 2011, totalizing 135 athletes. The prevalence of injuries reported during the entire 2010 season was investigated. Results: Out of the 135 athletes, 73 (54.1%) presented some kind of injury and 104 injuries were identified. Lower limb injuries accounted for 86.5% of the total, 28.9% (n = 30) on the ankle, 24% (n = 25) on the thigh and 23.1% on the knee (n = 24). Regarding the kind, 51.9% (n = 54) occurred without contact and 46.1% (n = 48) by direct contact. 59.6% of injuries occurred during technical/tactical or physical training (n = 62) and 40.4% (n = 42) occurred during games. 58.6% of injuries occurred for the first time and 40.4% were recurrent. No association between physiotherapeutic follow-up in training and competitions and the number and severity of injuries was found. Furthermore, no correlation between the dominant limb and hemi-body of the injury was found. Conclusions: The Brazilian women's futsal athletes have high prevalence of injuries, especially in the ankle, thigh and knee, and they mainly occur during training. Injuries that occur without contact with another opponent prevail in relation to with contact injury, a fact that contradicts the other findings in the literature. The number of first injuries was higher in comparison to recurrences, while in severity, moderate injuries were more common. In order to minimize the number of injuries, specific strategies are needed for prevention, focusing on the ankle, knee and thigh segments.

Keywords: indoor soccer, athletic injuries, women.

INTRODUCTION

Indoor soccer (futsal) has gathered a large number of participants due to its similar characteristics to field soccer. Due to it wide spread, especially from the end of the 1980 decade, the futsal space really consolidated and it gets more remarkable importance with the population[1,2].

Women's futsal has gained increasing space in Brazil and worldwide, and investment in the modality is a trend of all international confederations from now on. Since the modality is struggling to be part of the Olympic program, the strengthening of the category is crucial. In Brazilian land, the modality among women, besides having championships similar to the men's in the Brazil Cup and in the Brazilian Championship of Teams since 2005, also annually holds the National Women's Futsal League. The Brazilian female players, as well as male, have also conquered the world, acting in places such as the United States, Europe and Asia[3].

The evolution of the futsal practice is basically associated with the tactical, technical and physical aspects, requiring for this reason, increasing keen performance from the athlete. Thus, with the organization of more competitions and the trend of the teams to train more to adapt to this reality, the athlete is more physically demanded, which generates excessive training overload which can trigger in short, medium or long terms, trauma of different levels in the musculoskeletal apparatus, increasing the risk to injuries[4-8]. Moreover, competition and performance sports imply in very long time exposure to risk injury, which continuously tests their resistance, besides physical, psychological and mental adaptation limits[9].

The injuries caused by futsal practice and the high risks for their onset have been object of interest and concern of professional from the health field[10,11]. After all, in the majority of the cases they cause incapacity and determine time away, for varied periods of times, from training and competitions, in order to have them correctly and coherently treated[6]. Nonetheless, the data found in the literature injuries in futsal stress the male gender.

Thus, due to the predisposition of injuries in futsal athletes, it becomes important to identify them in the female gender so that prevention practices can be planned and implemented with the goal to attenuate the athlete's time away from the sport for injury. Therefore, the aim of the preset study was to identify the prevalence of injuries in Brazilian women's futsal athletes.

METHODOLOGY

A quantitative, descriptive study with transversal outlining was conducted.

The population of this study corresponded to female athletes from 11 teams which participated in the National Futsal League, 2011, in a total of 147 athletes, aged between 16 and 35 years, who played in the state teams of Rio Grande do Sul, Santa Catarina, São Paulo and Ceará. The questionnaires were applied during the first phase of the National Women's Futsal League, 2011, held in the cities of Chapecó-SC and Caçador-SC, in April, 2011. Firstly, the researchers contacted the ones in charge for

the teams and requested for the authorization from the involved institutions After that, the researchers explained about the study's proposal, collection and confidentiality of the subjects' identity. The athletes who volunteered signed then the Free and Clarified Consent Form. Athletes younger than 18 years old, needed to have the term signed by their parents or legal tutors.

The inclusion criteria of the research were: to be connected to the teams which played the national competitions; to be legally enrolled in the competition through the Brazilian Confederation of Indoor Soccer (CBFS); to be present in the city holding the competition, regardless of the presenting or not injury; to accept to voluntarily participate in the proposed study after having signed the consent form. The athletes who answered less than 75% of the questionnaire were excluded from the research. Therefore, 135 out of the 147 answered questionnaires were considered valid for the research.

The instrument used was a questionnaire on the prevalence of injuries adapted from Silva and Zanon[12], divided in questions which included the athlete's identification, the characteristic of the sports practice, as well as the injury description according to type, frequency and site. Variables concerning training quantity; injuries presented during the entire 2010 season, with the respective body segments injured; whether the injury has occurred by direct contact or without contact; in which situation (game, physical training or technical/tactical training); as well as the time away from the sport due to such injury were assessed.

In this study, injury was defined as injury with compromising which had presented at least one of the following consequences: decrease in the quantity or level of sports activity for at least one day, or which had needed medical evaluation or treatment[13-16]. The injury severity was determined by the time away from sports practice, having been classified in three categories: light (one to six days), moderate (seven to 28 days) and severe (more than 28 days away from the sport)[17].

Data obtained were analyzed through descriptive statistics with frequency (n) and percentage (%) of the number of injuries, site, injury manner, situation in which it occurred and severity. The chi-square test was used to associate the physiotherapist follow-up in training and competitions with the number of injuries and their severity as well as to associate the dominant limb of the athlete with the hemibody of the injury. The significance level adopted was $p < 0.05$.

This study was approved by the Ethics in Research Committee of the Community University of the Chapecó region under the protocol number 284/10.

RESULTS

Within the 135 athletes, the mean age was 21.2 years (± 4.0), mean body mass index (BMI) of 22kg/m^2 (± 2.26), with values which ranged between 18.1 and 27.3kg/m^2. The sports practice time ranged between one and 23 years, with mean of 10.8 years (± 4.3). The mean number of competitions played by each athlete in the year of 2010 was of 7.1 (± 3.5).

The tactical position of the athletes investigated included: 23 goal keepers, 25 defenders, 45 wings, 20 pivots, 13 defenders/wings and nine wings/pivots. Out of these, 102 had as dominant limb the right lower limb, 23 the lower left limb, five were ambidextrous and five did not reply to this question.

Out of the 135 athletes, 73 presented some kind of injury, totalizing 54.1% of the investigated sample. 104 injuries have been recorded in these athletes.

Table 1 presents the site of injuries, according to the body segment injured, and the ankle, thigh and knee were the sites with the highest number of injuries. Thus, the injuries in the lower limbs represented 86.5% of all injuries.

Table 2 demonstrates the situations in which the injuries occurred, their manner and type. The injuries occurred with highest incidence in the technical/tactical training, followed by the game and physical training. The injury manner: without contact was the most frequent. The number of first injuries was higher than recurrent ones.

However, in the ankle injuries (n = 30), 17 of them (56.7%) were recurrences, while 13 ankle injuries have occurred for the first time.

Table 3 illustrates the injuries according to their severity, where moderate ones (between seven and 28 days away) were the most prevalent, followed by severe injuries (> 28 days) and, finally, the light injuries (up to six days away).

No association between the physiotherapist follow-up in training and competitions with the number and severity of injuries has been found. Additionally, no statistically significant differences have em found concernign the dominant limb of the athlete and the hemibody of the injury ($p > 0.05$).

Table 1. Injury site, according to the body segment.

Segment	N	%
Ankle	30	28.9
Thigh	25	24
Knee	24	23.1
Hand and wrist	8	7.7
Foot	7	6.7
Elbow	2	1.9
Hip	2	1.9
Leg	2	1.9
Others*	4	3.9
Total	104	100

*Nose, lumbar spine, shoulder and one athlete did not report the site.

Table 2. Description of the injury according to the situation in which they occurred, manner and kind of injury.

Situation	N	%
Technical/tactical training	49	47.1
Game	42	40.4
Physical training	13	12.5
Total	104	100
Injury manner	N	%
Without contact	54	51.9
Direct contact	48	46.2
Did not report	2	1.9
Total	104	100
Kind of injury	N	%
First injury	61	58.6
Recurrent	42	40.4
Did not report	1	1
Total	104	100

Table 3. Description of the injury according to severity

Injury	N	%
Light (up to six days)	5	4.8
Moderate (seven to 28 days)	55	52.9
Severe (> 28 days)	35	33.7
Did no reply	9	8.6
Total	104	100

DISCUSSION

Futsal is a sport which presents characteristics similar to the field soccer [1]. Women's participation in this sport has never been as expressive as nowadays, which has created a self-reality in order to face the high standards of physical, technical and strategic of the modern sport. Therefore, thee standards invariably make any athlete, regardless of gender, prone to injuries[8].

The high level of the teams and the high training flow, games, competitions and trips demand a high level of preparation from the athletes. The muscle wear to which the athlete is submitted may bring serious unpleasant effects to the body, even leading to injuries which may temporarily keep him/her away from the sports activities.

The main characteristic of futsal is dynamism, and with the training load and games demand, the risk for injuries increases[5,7].

The investigation with the Brazilian women's futsal athletes recorded 73 presenting some kind of injury in the year of 2010, totalizing 54.1% of the investigated sample. Similar data are found in the studies by Abrahão *et.al.*[4] with a men's futsal team and by Jacobson and Tegner[17] in the Swedish women's soccer league. In other investigations, the number of injuries reached a higher percentage[15,18,19]. The European women's soccer, investigated during a season, presented lower incidence of injuries corresponding to 41% of the sample[20].

The lower limbs were the mostly injured, totalizing 86.5% of all injuries, corroborating the findings in the literature concerning the high prevalence of injuries in these segments, in soccer and futsal[6,15,17-23]. The disproportion between the body segments may be attributed to the higher demand of the lower extremity in the sport[4].

Regarding the mostly injured sites, there was predominance of ankle injuries, which also corroborated other studies already conduced in the women's soccer and men's futsal[4-6,11,14,18-20,23]. The high incidence of knee injuries is not something new, since the high prevalence of injuries on that site was also found in the literature in general[6,11,14,15,17,19,20]. The high number of muscle injuries on the thigh was surprising though and its frequency was similar to the number of injuries on the ankle and knee. High incidence of injuries on the thigh was found in the Swedish[15] and German women's soccer[17]. Such findings may be attributed to the lower muscle mass women present in comparison to men, having hence less strength. Women's strength is limited especially due to their reduced testosterone rate and the presence of reproductive hormones[8,24,25]. These characteristics may contribute to the higher predisposition of injuries in this segment.

Considering the number of injuries in the technical/tactical training and in the physical training, they totalized 59.6% (n = 62) of the injuries. Le Gall *et.al.*[18] and Tegnander *et al.*[22] obtained similar results in their studies, with a higher number of injuries in training than in games. This fact may be explained by the higher amount of training than the number of games during the entire season. On the other hand, Dantas and Silva[5] and Faude *et. al.*[15] found a higher number of injuries during games. Despite the fact the number of games was much lower than the amount of training, the prevalence of injuries in games was high (n = 42). This can be explained by the higher competitiveness and aggressiveness of the games, since as the level of competition increases, the risk of injury increases as well[5,10].

Concerning the injury manner, 51.9% (n = 54) occurred without contact and 46.1% (n = 48) by direct contact; two athletes did not report the manner the injured occurred. Such findings clash with the ones found in the literature, in which the majority of the injuries occurred by contact with another player[5,6,14,21,23,26,27]. The injury patterns in women may be a consequence of structural, mechanical, neuromuscular factors or a combination of them. A potential contribution may be regarding the difference between genders in the articular stability from the active muscular tension (stiffness)[25]. This high incidence rate of injuries without contact may also be an indication that the athletes had an inadequate preparation for the demand of games and competitions which the calendar required[14].

In the research, 58.6% of the athletes had injury for the first time and 40.4% were recurrent. An athlete did not report the kind of injury. Such results are compatible with the literature, which reports that the number of injuries by recurrence is also lower than the first timers[13,17,18]. Regardless of the mechanisms, the injuries may occur without previous history of injury (first injury), or be recurrent from previous injury; that is, the existence of past history of injury in that structure (at least once)[9]. Conversely, in the injuries on the ankle reported in the present study, 17 of them (56.7%) were recurrent, a result similar to the ones found in the studies by Söderman *et al.*[20], where 56% of the injuries on the ankle were recurrences.

Concerning the severity of the injuries, determined by the time away from the sports practice, 55 (52.9%) were moderate injuries, 35 (33.7%) were severe, five (4.8%) were light and nine (8.6%) athletes did not reply to the time away. High rate of moderate and severe injuries was observed. Similar result was recorded in the Dutch men's futsal with 27% of severe injuries[13]. Studies carried out in the women's soccer corresponded to a lower number of severe injuries than the ones found in futsal, with severe injuries ranging between six and 15% of all injuries[15,18-20,23].

Since it is a retrospective study, it is believed that many light and moderate injuries have not been described for having not interfered much in the training and games process o the athlete, and therefore, have not been remembered by them. Junge and Dvorak[28] suggest the performance of prospective studies justifying that the shorter the period of symptoms and the more distant the time the injury occurred, the easier it is to forget about the episode. Another data recording method which avoids the forgetting of injuries can be obtained with daily record for the athletes, and/or training and competitions filming.

Even if the injury sites and situations in which they occur and the mechanisms are different in some investigated populations, it is a consensus in the literature that prevention strategies are the best way to minimize the incidence of injuries[10,14,15,18,21,23,29].

CONCLUSION

The Brazilian women's futsal athletes present high prevalence of injuries, especially on the ankle, thigh and knee, and the majority of them occur during training. Injuries which occur without contact with another opponent are more present than trauma with contact, a fact which disagrees with the other findings in the literature. The number of first injuries was higher than recurrences, and concerning severity, moderate injuries were the most present.

In order to minimize the number of injuries, specific prevention strategies which emphasize the ankle, knee and thigh segments are needed, since the results obtained evidenced that the Brazilian female futsal athletes presented high prevalence of injuries on those segments.

Regarding the high rate of muscle injuries on the thigh, it is suggested the performance of studies which approach muscle retractions, especially of the hip adductor, hamstring and quadriceps femoris musculature to analyze and verify the correlation with the injury index. Another item which can be investigated is the correlation between muscular stretching and strength training in the sports practice versus muscular injuries.

Regarding the injuries without contact, more specific information about the injury mechanisms is needed so that specific and efficient prevention methods can be designed.

All authors have declared there is not any potential conflict of interests concerning this article.

REFERENCES

1. Triques, PD. A prática precoce do futsal por crianças em situação de treinamento. Rev Saberes e Fazeres Educativos 2005;4:33-5.
2. Rezer R, Saad MA. Futebol e Futsal: possibilidades e limitações da prática pedagógica em escolinhas. Chapecó: Argos, 2005.
3. Confederação Brasileira de Futebol de Salão. http://www.futsaldobrasil.com.br/2009/cbfs/origem.php. (acesso em: 10 de junho de 2011.
4. Abrahão GS, Caixeta LF, Barbosa LR, Siqueira DP, Carvalho LC, Matheus JP. Incidência das lesões ortopédicas por segmento anatômico associado à avaliação da frequência e intensidade da dor em uma equipe de futebol amador. BRJB 2009;3:152-8.
5. Dantas JA, Silva MR. Frequência das lesões nos membros inferiores no futsal profissional. Rev Fac Ci Saúde 2007;4:220-9.
6. Kurata DM, Junior JM, Nowotny JP. Incidência de Lesões em Atletas Praticantes de Futsal. Iniciação Científica CESUMAR 2007;9:45-51.
7. Moreira D, Godoy JR, Braz RG, Machado GF, Santos HF. Abordagem cinesiológica do chute no futsal e suas implicações clínicas. R Bras Ci e Mov 2004;12:81-5.
8. Simões AC. Mulher e Esporte: mitos e verdades. São Paulo: Manole, 2003.
9. Oliveira R. Lesões nos Jovens Atletas: conhecimento dos fatores de risco para melhor prevenir. Revista Portuguesa de Fisioterapia no Desporto 2007;13:33-8.
10. Brito J, Soares J, Rebelo NA. Prevenção de lesões do ligamento cruzado anterior em futebolistas. Rev Bras Med Esporte 2009;15:62-9.
11. Ribeiro CZ, Akashi PM, Sacco IC, Pedrinelli A. Relação entre alterações posturais e lesões do aparelho locomotor em atletas de futebol de salão. Rev Bras Med Esporte 2003;9:91-7.
12. Silva MR, Zanon CS. Avaliação postural de jogadores de futebol de salão. 2001. Monografia (Pós-graduação em Fisioterapia em Ortopedia e Traumatologia). ACE, Joinville, 2001.
13. Van Hespen A, Stege JP, Stubbe JH. Soccer and futsal injuries in the netherlands. Br J Sports Med 2011;45:330.
14. Ribeiro RN, Costa, LO. Análise Epidemiológica de Lesões no Futebol de Salão Durante o XV Campeonato Brasileiro de Seleções Sub 20. Rev Bras Med Esporte 2006;12:1-5.
15. Faude O, Junge A, Kindermann W, Dvorak J. Injuries in female soccer players: a prospective study in the German national league. Am J Sports Med 2005;33:1694-700.
16. Söderman K, Alfredson H, Pietilä T, Werner S. Risk factors for leg injuries in female soccer players: a prospective investigation during one out-door season. Knee Surg Sports Traumatol Arthrosc 2001;9:313-21.
17. Jacobson I, Tegner Y. Injuries among Swedish female elite football players: a prospective population study. Scand J Med Sci Sports 2007;17:84-91.
18. Le Gall F, Carling C, Reilly T. Injuries in young elite female soccer players: an 8-season prospective study. Am J Sports Med 2008;36:276-84.
19. Engström B, Johansson C, Tornkvist H. Soccer injuries among elite female players. Am J Sports Med 1991;19:372-5.
20. Söderman K, Adolphson J, Lorentzon R, Alfredson H. Injuries in adolescent female players in European football: a prospective study over one outdoor soccer season Scand J Med Sci Sports 2001;11:299-304.
21. Junge A, Dvorak J. Injury risk of playing football in Futsal World Cups. Br J Sports Med 2010;44:1089-92.
22. Tegnander A, Olsen OE, Moholdt TT, Engebretsen L, Bahr R. Injuries in Norwegian female elite soccer: a prospective one-season cohort study. Knee Surg Sports Traumatol Arthrosc 2008;16:194-8.
23. Junge A, Dvorak J. Injuries in female football players in top-level international tournaments. Br J Sports Med 2007;41(Suppl I):i3-i7.
24. Weineck J. Biologia do Esporte. São Paulo: Manole, 2000.
25. Andrews JR, Harrelson GL, Wilk KE. Reabilitação física do atleta. 3. ed. Rio de Janeiro: Elsevier, 2005.
26. Bortoli R, Bortoli AL, Márquez S. Incidencia causas y prevención de lesiones deportivas en el futbol sala. Arch Med Deporte 2001;18:205-10.
27. Hoy K, Lindblad BE, Terkelsen CJ, Helleland HE, Terkelsen CJ. European soccer injuries. A prospective epidemiologic and socioeconomic study. Am J Sports Med 1992;20:318-22.
28. Junge A, Dvorak J. Influence of definition and data collection on the incidence of injuries in football. Am J Sports Med 2000;28:S40-6.
29. Hagglund M, Walden M, Ekstrand J. Injuries among male and female elite football players. Scand J Med Sci Sports 2009;19:819-27.