

Prevalence of sport injuries during the 53th Regional Games in Franca (SP), Brazil

Prevalência de lesões esportivas durante os 53^{os} Jogos Regionais em Franca (SP), Brasil

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ABSTRACT | The purpose of this study was to perform a survey about the prevalence, type and location of the injuries occurred in athletes of different modalities during the 53th Regional Games held in 2009. A total of 182 injured athletes being treated at the physical therapy clinic were included. Physical Therapy evaluation was performed to determine the anatomic location and type of injury, as well the sport modality. The results showed that mean age, height, weight and BMI were 23 years (± 5.9), 1.73 m (± 0.11), 71 kg (± 14.22) and 24 kg/m² (± 4) respectively. Proportionality to the number of athletes, handball athletes presented with higher number of injuries (4.25%), followed by indoor soccer players (3.7%), basketball (2.48%), volleyball (1.72%) and soccer (1.63%). The most common type of injury were sprains with 29.7% of cases (n=54) and mostly from soccer players; followed by contracture - 26.9% (n=49), mostly from basketball players; and contusion - 25.8% (n=47), mostly from handball and indoor soccer players. The type of injury showed a significant association with the sports modality (p=0.0016). The lower limbs accounted for 71.4% of all injuries including knee (23.1%), ankle (18.1%), thigh (17.0%), leg (10.4%) and spine (9.9%). Preventive actions to avoid athletes' injury should be implemented in order to reduce the number of injuries in sports competitions such as in the Regional Games.

Keywords | athletic injuries; athletes; prevalence; soccer; volleyball.

RESUMO | O objetivo do presente estudo foi investigar a prevalência, tipo e localização anatômica das lesões nos atletas durante os 53^{os} Jogos Regionais de 2009. No total, 182 atletas participaram do estudo. A avaliação fisioterápica incluiu dados como local e tipo de lesão e modalidade esportiva. Os resultados mostraram que a média de idade, altura, peso e IMC foram respectivamente 23 anos ($\pm 5,9$), 1,73 m ($\pm 0,11$), 71 kg ($\pm 14,22$) e 24 kg/m² (± 4). Proporcionalmente ao número de atletas, o handball foi a modalidade esportiva que apresentou maior número de lesões (4,25%), seguidos pelos atletas de futsal (3,70%), de basquete (2,48%), de voleibol (1,72%) e de futebol (1,63%). O tipo de lesão mais comum foi entorse com 29,7% dos casos (n=54), ocorridos com maior frequência em jogadores de futebol; seguido de contractura - 26,9% (n=49), ocorridos com maior frequência em jogadores de basquete; e contusão - 25,8% (n=47), ocorridos com maior frequência em jogadores de handball e futsal. O tipo de lesão mostrou significativa associação com o tipo de esporte praticado pelo atleta (p=0,0016). Os membros inferiores representaram 71,4% de todas as lesões, sendo o joelho o local mais acometido, com 23,1% dos casos, seguido do tornozelo - 18,1%, coxa - 17%, perna - 10,4% e coluna vertebral - 9,9%. Programas de prevenção para os atletas devem ser desenvolvidos e implantados a fim de reduzir o número de lesões em competições esportivas como os Jogos Regionais.

Descritores | traumatismos em atletas; atletas; prevalência; futebol; voleibol.

The study was developed in Department of Physical Therapy of the Universidade de Franca (UNIFRAN) - Franca (SP), Brazil.

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INTRODUCTION

The Regional Games started in the 1950s in the city of Presidente Prudente, countryside of São Paulo state in Brazil. The games are played by teams from each local region of the state and upon qualification; the teams compete at the Open Games. The Regional Games include a great number of recreational athletes, and a high incidence of injury in these athletes is expected¹.

Regular physical activity is essential for the prevention of various diseases and reduces the risk of premature mortality in general and coronary heart disease, hypertension, colon cancer, obesity and *diabetes mellitus* in particular^{2,3}. However, little attention has been given to the risks induced by sports, particularly in recreational athletes. More studies on the risks involved in sports in different settings are also needed. The inappropriate practice and the lack of assistance from a qualified professional are detrimental to the athlete's health, causing serious injury and, consequently, the early abandonment of the sport and physical activity⁴.

The incidence of injuries in athletes may be related to some intrinsic factors, as age, gender, physical condition, motor development, diet and psychological factors, as well as extrinsic factors that are associated with the specific requirements of each modality, type of equipment used, organization and training load, competition, weather conditions or a combination of factors⁵⁻⁸. Other factors as experience in practicing sports and the number of hours per week of training may also influence sports associated injuries⁶. In addition, since injuries are classified into traumatic or non-traumatic (overuse), each type of sport may induce specific types of injuries. For instance, the non-contact sports, for example, tennis, swimming, table tennis, athletics and gymnastics, are associated with non-traumatic lesions as tendonitis. On the other hand, traumatic injuries are common in contact sports, such as basketball, soccer, handball and indoor soccer^{9,10}.

The understanding of the causes and prevalence of any particular injury type in a given sport is essential in order to address the potential for sports injury prevention afterward. Thus, the purpose of this study was to investigate the prevalence, type and anatomic location of the injuries occurred in athletes of different modalities during the 53th Regional Games in Franca, São Paulo state, Brazil.

MATERIALS AND METHODS

The data were collected during the 53th Regional Games held in the city of Franca, Brazil, in the Physical Therapy Clinic of the Universidade de Franca during the treatment given to the injured athletes between July 15th and July 25th in 2009. In this study, injuries were defined as any event that occurred to the athletes during the matches or training that caused a reduction or complete withdrawal of their participation in the competition, including the need for treatment in order to continue competing. The athletes were evaluated using a Physical Therapy evaluation form and they were included in this study by using a convenience sample. Therefore, only the athletes seeking treatment at the clinic were included. This study was approved by the Research Ethics Committee (File#0122/09).

The study was conducted with athletes of both genders who competed in the following collective modalities in the 53th Regional Games: handball, volleyball, indoor soccer, soccer and basketball. Physical Therapy evaluation was performed to determine the anatomic location and type of injury, sport modality and personal information such as age, gender, height, weight and body mass index (BMI).

The prevalence of injury by sport's modality was determined by considering the proportion of injured athletes in relation to the total number of athletes by modality. The prevalence of injury by sport's modality was determined by considering the total number of injured athletes (n=182). The prevalence comparison of the injury between genders was performed by using the χ test considering the proportion of athletes injured in relation to all athletes participating in the competition of each sex (n=6.923) and not by the total number of athletes injured. The association between the type of injury and sport's modality was analyzed from the contingency table using χ test.

It was grouping categories related to lesion sites in the upper limbs (hand, arm, elbow and shoulder), lower (foot, ankle, leg, knee and thigh) and trunk (spine and scapula) to verify the difference between the frequencies of the lesion and sport's modality. It was used analysis of multiple proportions (multiple comparisons for proportions). The statistical analysis was performed using GraphPad InStat version 3.06 for Windows (GraphPad Software Inc.). The test was conducted using α -level<0.05.

RESULTS

From 6.923 athletes who participated in the competition on collective sport, 182 (2.6%) had some type of injury and were evaluated in Physical Therapy Clinic at the Universidade de Franca. From those 182 athletes, 102 were male (56.0%) and 80 were female (44.0%), which represented 2.7% and 2.6% of male and female respectively from the total athletes. No significant difference to the prevalence of injury was found between genders ($p=0.927$). The results showed that mean age, height, weight and BMI were 23 years (± 5.9), 1.73 m (± 0.11), 71 kg (± 14.22) and 24 kg/m² (± 4) respectively.

The sport's modality that presented the greatest prevalence of injury was handball as 4.25% of all handball players from the Regional Games were injured, followed by indoor soccer with 3.70% of indoor soccer players injured. Soccer was showed to have the lowest prevalence with 1.63% of injured players (Figure 1).

The most common types of injuries were sprains with 29.7% of the cases ($n=54$), followed by contracture with 26.9% ($n=49$) and contusion with 25.8% ($n=47$), which together account for more than 75.0% of cases. The type of injury showed a significant association with the sport practiced by the athletes ($p=0.0016$). Contusion was more common in handball and indoor soccer, sprains were more common in handball and indoor soccer, sprains were more common in soccer, contracture was more common in basketball and tendonitis was more common in volleyball (Figure 2).

Regarding the anatomic location of the injury, lower limbs accounted for 71.4% of all injuries. The knee was the most affected region with 23.1% of cases ($n=42$), followed by the ankle with 18.1% ($n=33$), thigh with 17.0% ($n=31$) and leg with 10.4% ($n=19$). Among other locations, the spine appears most frequently in 9.9% of the cases ($n=18$) (Figure 3).

The test of proportions among multiple injury sites for each type modality showed that only handball was significant different for the upper limbs ($p<0.01$). For the other modalities, it did not differ between the sites of injury (Table).

DISCUSSION

This study evaluated 182 injured athletes from the 53th Regional Games. A retrospective analysis on the prevalence of sports injury during the games using the evaluation forms was performed.

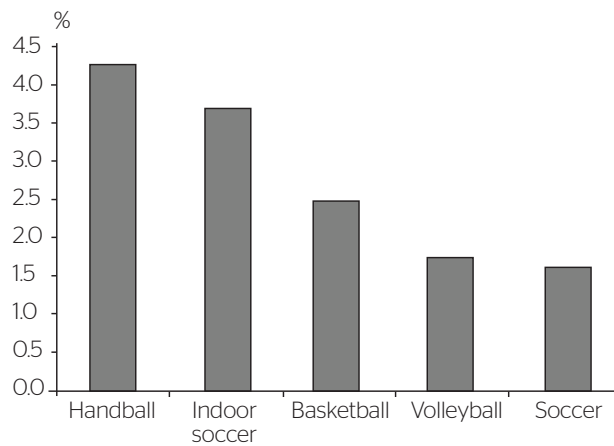


Figure 1. Prevalence of injury by sport's modality

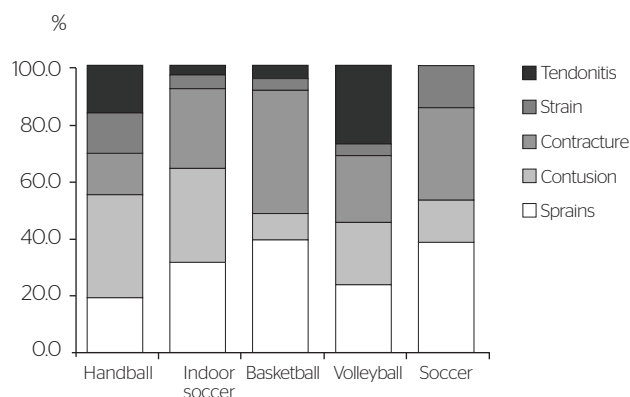


Figure 2. Injury type distribution according with the sport's modality

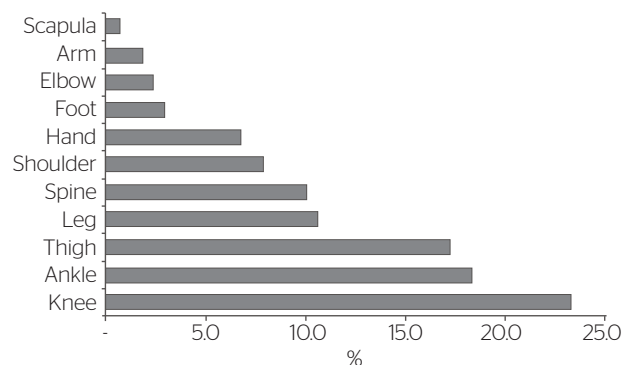


Figure 3. Injury site distribution

The prevalence of different types of injuries was similar to what was found in other studies involving teenagers and children^{11,12}. However, the number of injuries was higher than those found in studies involving adult athletes in elite sports¹³. This may possibly be explained by suboptimal/inadequate strategies and techniques, as well as inadequate muscular strength, poor coordination or lack of experience of the athletes participating in this study compared with professional athletes.

Children and adolescents engage in many sports to improve their body composition, physical fitness, bone density and diameter, but the sport is often practiced

Table. Prevalence distribution of the lesion site and sport modality

Modality	Lesion site			p-value [#]
	Upper limb 18.1% (n=33)	Trunk 10.4% (n=19)	Lower limb 71.4% (n=130)	
Handball	45.5%** (15)	21.1% (4)	17.7% (23)	<0.01
Indoor soccer	18.2% (6)	36.8% (7)	36.9% (48)	0.119
Basketball	6.1% (2)	10.5% (2)	14.6% (19)	0.401
Volleyball	21.2% (7)	15.8% (3)	9.2% (12)	0.147
Soccer	9.1% (3)	15.8% (3)	21.5% (28)	0.247

[#]p-value according χ^2 to multiple proportions test.

**Differs significantly from the other sites of injury for the same modality.

without correct orientation which may predispose them to injuries¹⁴. Most of the delegations often reported not having training program arrangements in place in their cities for their athletes, which may explain the similar incidence of injuries observed in studies involving children and teenagers. Possible changes in the training system and attendance of these athletes, focusing on physical component, skills and techniques may reduce the incidence and prevalence of injuries¹¹.

Regarding the type of injury, sprain, contracture and contusion are commonly observed in contact sports. In the study by Ribeiro et al.¹¹, contusion was observed in 29.0% of the athletes playing soccer. This finding is similar to the results from the present study where 33.0% of indoor soccer athletes and 15.0% of the soccer players presented contusion. A high frequency of contusion was also observed in handball and indoor soccer modalities, while sprains were more frequent in soccer players. There is a growing trend for a more aggressive style in soccer in which strength, speed and sudden changes of direction and acceleration is observed, predisposing these athletes to injuries¹⁵ such as sprains. This type of injury may also be explained by the fact that soccer players use the locking cleats to help the grip into the grass and that may cause injuries, as tendinitis and muscle strain, also commonly observed in some sports such as track and field or non-contact sports, as volleyball¹⁶. This is in agreement with the results of this study as tendinitis was mostly seen in volleyball players.

In another study involving soccer players with similar age to the soccer players included in this study, a higher incidence of injuries like sprains was observed, and the ankle was the most affected region. The authors explained this result by associating this injury with the higher incidence of postural deviations of the knee and pelvis in these athletes¹⁷. Another study reported a lower flexibility of the posterior muscles of the lower limbs in soccer players, suggesting that the modality of soccer

may be associated with chronic stiffness of the posterior muscles, which may predispose them to injury¹⁸.

The association found in handball with upper limb injuries can be explained because this sport is practiced with hands. However, the number of injury in handball was high in lower limb, following upper limb and trunk. Other studies have also shown the same results in this modality^{12,19}.

The knee, ankle and thigh were the sites with more frequency of injuries in the athletes included in the present study. Similar results were also found in other studies^{11-13,19}. This may be associated with greater demand and exposure of these joints in contact sports. Serious knee injuries, as those in the anterior cruciate ligament, are a growing cause for concern. These injuries can have serious consequences for the injured athlete, not only in terms of treatment costs and time lost from practicing and playing sport but also a greatly increased risk of early osteoarthritis²⁰.

According to Lopes et al.¹⁰, injury is caused by a traumatic agent, in which a sudden mechanical factor acts on the tissues of the body segment directly or indirect overcoming their resistance. Over-training, high frequency of matches and sudden movements in a short period of time are increasingly demanding the athlete's physical capacity, predisposing them to muscle and joint injuries.

Therefore, based on the results from this study, some procedures need to be implemented to overcome these issues. The development of preventive programs and health promotion is important to reduce number of injuries in competitive sports, especially in the Regional Games, in which different levels of athletes are found (amateurs and professionals). In fact, studies have shown that it may be possible to reduce the incidence of knee and ankle injuries in adults and adolescents by using various training programmes²¹.

The development of preventive programs will depend on the investment from municipal governments in

order to create facilities that actually promote sport and health for the population in each region. This is particularly important since many delegations hired athletes from outside the region, demonstrating the interest in having immediate outcomes in the Regional Games. The investment in sports within the municipality may encourage more individuals to the practice of sports within the city, which promotes health and creates opportunities to reveal future athletes. However, this was not investigated in the present study.

CONCLUSION

This study revealed that there was a higher prevalence of sprains, contractures and contusions involving mainly the lower limbs (knees, ankles and thigh) in contact sports such as handball and indoor soccer during the 53th Regional Games in Brazil. Prevention programs should be implemented to overcome the prevalence of these injuries in both amateurs and professional athletes.

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