

# SCIENTIFIC SPORTS MEDICINE IN PREVENTING SPORTS INJURIES OF COLLEGE STUDENTS



ORIGINAL ARTICLE  
ARTIGO ORIGINAL  
ARTÍCULO ORIGINAL

A MEDICINA DO ESPORTE CIENTÍFICA NA PREVENÇÃO DE LESÕES POR ESPORTE EM ESTUDANTES UNIVERSITÁRIOS

LA MEDICINA DEL DEPORTE CIENTÍFICA EN LA PREVENCIÓN DE LESIONES POR DEPORTE EN ESTUDIANTES UNIVERSITARIOS

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## ABSTRACT

**Introduction:** As the frequency and intensity of school sports activities continue to increase, accidental injuries occur from time to time during sports activities. **Objective:** This article discusses the positive role of science and technology in sports medicine in promoting sports development. At the same time, the advantages of medical sports to sports injuries are analyzed. **Methods:** This article uses mathematical statistics to understand the current situation of college students' sports injuries and risk prevention and control, and discusses the effect of sports medicine on sports injuries. **Results:** There is a significant difference between the student's sports injury and the number of times, the time, and the amount of exercise they participate in each week. The longer the participation in sports, the more minor the sports injuries are. **Conclusion:** Strengthening physical education and strengthening awareness of sports risk prevention and control in student teaching can help students avoid sports injuries. **Level of evidence II; Therapeutic studies - investigation of treatment results.**

**Keywords:** Sports Medicine; Athletic Injuries; Athletic Performance.

## RESUMO

**Introdução:** À medida que a frequência e a intensidade de atividades esportivas escolares continuam a aumentar, lesões acidentais podem ocorrer periodicamente durante essas atividades. **Objetivo:** Este artigo discute o papel positivo da ciência e da tecnologia na medicina do esporte ao promover o desenvolvimento de esportes. Concomitantemente, as vantagens da medicina do esporte para as lesões do esporte são analisadas. **Métodos:** Este artigo utiliza estatísticas matemáticas para compreender a situação atual das lesões por esporte de estudantes universitários e a prevenção e o controle de riscos, e discute o efeito da medicina do esporte nas lesões do esporte. **Resultados:** Há uma diferença considerável entre a lesão por esporte dos estudantes e o número de vezes, a hora e a quantidade de exercício que eles praticam a cada semana. Quanto mais participam em esportes, menores serão as lesões. **Conclusão:** O fortalecimento da educação física e da conscientização sobre a prevenção e o controle de risco no esporte na formação dos estudantes pode ajudá-los a evitar lesões no esporte. **Nível de evidência II; Estudos terapêuticos – investigação de resultados de tratamento.**

**Descritores:** Medicina Esportiva; Traumatismos em Atletas; Desempenho Atlético.

## RESUMEN

**Introducción:** En la medida que la frecuencia y la intensidad de actividades deportivas escolares continúan a aumentar, lesiones accidentales pueden ocurrir periódicamente durante esas actividades. **Objetivo:** Este artículo discute el papel positivo de la ciencia y tecnología en la medicina del deporte al promover el desarrollo de deportes. Simultáneamente, se analizan las ventajas de la medicina del deporte para las lesiones del deporte. **Métodos:** Este artículo utiliza estadísticas matemáticas para comprender la situación actual de las lesiones por deporte de estudiantes universitarios y la prevención y control de riesgos, y discute el efecto de la medicina del deporte en las lesiones del deporte. **Resultados:** Hay una diferencia considerable entre la lesión por deporte de los estudiantes y el número de veces, la hora y la cantidad de ejercicio que practican a cada semana. Cuánto más participan en deportes, menores serán las lesiones. **Conclusión:** El fortalecimiento de la educación física y de la conscientización sobre la prevención y el control de riesgo en el deporte en la formación de los estudiantes puede ayudarles a evitar lesiones en el deporte. **Nivel de evidencia II; Estudios terapéuticos – investigación de resultados de tratamiento.**

**Descritores:** Medicina Deportiva; Traumatismos en Atletas; Rendimiento Atlético.



DOI: [http://dx.doi.org/10.1590/1517-8692202127082021\\_0381](http://dx.doi.org/10.1590/1517-8692202127082021_0381)

Article received on 07/29/2021 accepted on 08/18/2021

## INTRODUCTION

School physical education is an essential part of school education. The quality of school physical education directly affects Chinese high-level talent training and national physical fitness. School sports

can invigorate the cultural life of students and have the function of enhancing students' physical fitness. As the frequency and intensity of school sports activities continue to increase, accidental injuries occur from time to time during sports.<sup>1</sup> Accidental injuries may harm

the health of the body and may cause sudden death and disability of students. Therefore, it has a significant impact on school physical education. How to prevent and reduce the occurrence of sports injury accidents of college students has become the main problem that needs to be solved urgently in school sports work.

## METHODS

### Research object

The thesis takes sports injury accidents and risks prevention and control of college students as the research object.

### Research methods

#### Literature data method

We searched the CNKI database with keywords such as “college student sports injuries” and “school sports risk prevention and control.” We found a total of 31 articles about college students’ sports injury accidents and a total of 14 articles about school sports risk prevention and control.<sup>2</sup> By searching such documents, we can understand the current causes of college students’ sports injury accidents and the prevention and control of school sports risks.

#### Questionnaire survey method

A total of 800 student questionnaires were distributed. 800 copies were recovered, and the recovery rate was 100%. 37 invalid questionnaires were eliminated, and 763 valid questionnaires were obtained.<sup>3</sup> The effective recovery rate is 95.4%. A total of 16 expert questionnaires were distributed. Each school-issued 2 copies and recovered 16 copies. The effective recovery rate was 100%.

#### Mathematical Statistics

Data statistics use SPSS17.0 Chinese version application software to perform statistical processing on the collected data using frequency analysis in descriptive analysis.

### Establishing a sports injury model of athletes’ bone joints

When analyzing the sports injuries of athletes’ bones and joints, we first obtain the mutual information between the characteristics of the factors that lead to bone and joint injuries in training. The article establishes the system principal model of an athlete’s bone and joint injury.<sup>4</sup> The specific steps are detailed below:

Suppose that  $B$  represents the bone and joint injury feature space  $v$ . The hurdle training on the bone and joint injury sample data set.  $\partial$  represents the original bone and joint injury sequence.  $\xi$  represents the training time sequence of the athletes.  $\rho$  represents the feature vector corresponding to the feature value of the bone joint. We use formula (1) to obtain the mutual information between the characteristics of the bone and joint damage factors during training

$$\Lambda(K) = \frac{B[v^* \xi]}{\partial(s, l)} \Phi(j, k) \quad (1)$$

$S$  represents the cost function that causes damage to the athlete’s bones and joints.  $I$  represents the maximum energy produced by the bones and joints when the body moves.  $\Phi$  represents the athlete’s maximum training load.  $j$  represents the marginal probability distribution of the injury factor characteristics of the bone and joint.  $k$  represents the joint probability distribution of the injury factor characteristics of the bone and joint.  $\Psi$  represents the mutual information between the characteristics of the two bone and joint injury factors.  $k$  represents the principal component of the damage factor.<sup>5</sup> We use the eigenvalues of the mutual information matrix of bone and joint injury factors as the evaluation criterion to determine

the number of principal components that affect the bone and joint injury by hurdle training. We use formula (2) to express

$$\bar{\omega}(l, n) = \frac{\Psi \times [k]}{\theta(\zeta \otimes B[l])} \otimes \mu(a, \varphi) \quad (2)$$

$\Theta$  represents the mutual information matrix of the bone and joint injury factor set.  $\zeta$  represents the cumulative contribution rate.  $l$  represents the bone and joint injury characteristics of different training nodes.  $\mu$  represents the nature of bone and joint injury.  $a$  represents the type of bone and joint injury.  $\varphi$  represents the dynamic change law of bone and joint injury.<sup>6</sup>  $H_\varphi$  represents the training intensity level.  $\varphi(k)$  represents the impact probability of an athlete’s bone and joint injury.  $T(l)$  represents the minimum load strength of the bone joint in the half-flexion position.  $T(\chi)$  represents the maximum load strength of the bone joint in the half-flexion position. We use formula (3) to establish the impact probability matrix of athletes’ bone and joint injuries under different training intensities

$$M(\varphi) = \bar{\omega}(l, n) \cdot \frac{H_\varphi \times \varphi(k)}{T(l)} \square T(\chi) \times \Lambda(W) \quad (3)$$

$\Lambda(W)$  represents the information of the original bone and joint injury variables.  $i(k)$  represents the characteristics of bone and joint sports injuries.  $\phi(\rho)$  represents the correlation matrix of each bone and joint injury factor. We use formula (3) as the basis and use formula (4) to establish a system principle model of athletes’ bone and joint injury

$$D(\gamma) = \frac{M(\varphi) \square T(\lambda)}{\bar{\omega}(l, n) \times i(k)} \Lambda(K) \phi(\rho) \quad (4)$$

The formula  $\lambda$  represents the maximum intensity load that can be borne under normal bone and joint motion. When we use the system principle model of athlete’s bone and joint injury to analyze the impact of the characteristics of bone and joint sports injury, it is necessary to study the law between hurdle training and bone and joint injury.

## RESULTS

### Investigation and analysis of the status quo of college students’ sports injury accident

#### Number of sports injury accidents among college students

Among the students surveyed, 321 students have had sports injuries during their time at school, accounting for 42.1% of the surveyed subjects. Among them, 166 students had suffered a sports injury accident, accounting for 21.8% of the surveyed subjects.<sup>7</sup> 94 students have suffered two sports injury accidents, accounting for 12.3% of the surveyed number. 61 students who have suffered 3 or more sports injury accidents, accounting for 8% of the surveyed number.

#### Male to female ratio of college students in sports injury accidents

The survey results reflect that among college students who have had sports injuries in colleges and universities, both the number and frequency of injuries among boys are much higher than those of girls (Table 1).

**Table 1.** The ratio of male to female students in sports injury accidents (n=321).

	Once		Twice		≥Third	
	male	Female	male	Female	male	Female
Number/person	82	84	52	42	48	13
Accounted for the total number of people/%	25.5	26.2	16.3	13.1	15	4
Per gender/%	45.1	60	28.6	30.2	26.4	9.4

## Injury accidents occurred in sports activities in different sports scenes

The extracurricular sports activities carried out by individual students have the highest probability of sports injury accidents, with 168 people. This accounts for 52.3% of the number of students who have experienced sports injury accidents. Ranked second is the sports activities organized by the school, with 134 people. This accounts for 41.7% of the number of students who have suffered injuries.<sup>8</sup> The lowest incidence of sports injury accidents is in physical education, with 80 people. This accounts for 24.9% of the number of students who have suffered injuries.

## Investigation and analysis of the causes of sports injury accidents of college students

### Causes of injury accidents in a physical education class

In the physical education class, the main reason for the injury of middle school students is the lack of self-protection consciousness. This accounts for approximately 93.8%. Due to the aging of school premises and equipment, there are hidden safety hazards that caused 31.3% of college students to be injured. Teachers did not provide adequate education for them, and the reasons for the student's injuries were 12.5% of the reasons that the safety protection measures were not enough. There are 5% of the reasons that students have potential diseases or have congenital diseases and injuries.

### Reasons for injuries in sports competitions or sports organized by the school

It can be seen from Table 2 that the number one cause of sports injury accidents is that students do not abide by the rules of the game, accounting for about 84.3%. The second is that the school is negligent in management and does not have full safety measures. This accounts for about 73.1%; the third place is that sports competitions are too intense. Students from 58.2% in frequent collisions; the last is the aging of school facilities and potential safety hazards. This accounts for approximately 11.9%. The existence of various uncertain factors in sports competitions or sports meets organized by the school will cause college students' sports injury accidents.

## Analysis of the status quo of risk prevention and control in college sports

### The establishment of a sports risk prevention and control mechanism

It can be seen from Table 3 that only one university has established a relatively complete sports risk prevention and control mechanism. The establishment of sports risk prevention and control mechanisms in 6 colleges and universities is continuously improved. However, one university has not yet begun to establish a sports risk prevention and control mechanism.

**Table 2.** Reasons for injury accidents of students in sports competitions or games organized by the school (n=134).

	Number/person	proportion/%
The student did not abide by the rules of the game in the game	113	84.3
Intense competition and reasonable typical collisions in sports competitions	78	58.2
School management is negligent, and safety measures are not in place	98	73.1
School venues and equipment exist	16	11.9

**Table 3.** Whether the school has established a comprehensive sports risk prevention and control mechanism (n=16).

	Already established	Partially established	Building	Not established
Number/person	2	6	6	2
School/office	1	3	3	1

## The establishment of the sports risk prevention and control system and the handling plan for sports injury accidents

Only one private college among the eight colleges and universities investigated has established a plan for handling school sports accidents. Five private colleges and universities have more or less established plans for handling school sports accidents. However, there are still two private colleges and universities that have not yet begun establishing a sports accident handling plan.

### Purchase of sports equipment

It can be seen from Table 4 that among the 8 colleges and universities surveyed, 7 private colleges and universities purchase sports equipment and facilities following national standards. Only one private college did not purchase school sports equipment and facilities following national standards.

**Table 4.** Whether the school purchases sports equipment according to national standards (n=16).

	Yes	no
Number/person	14	2
School/office	7	1

## DISCUSSION

Extracurricular activities carried out by students, or sports activities organized by the school (sports games or sports competitions) are areas with a high incidence of sports injury accidents. The main reason is that students lack practical preparation activities and self-protection during extracurricular sports activities or school-organized sports activities (sports games or sports competitions). When the sport reaches the excitement point, students will forget to protect themselves, prevent themselves, and cause sports injuries. In addition, extracurricular sports activities or school-organized sports activities are mainly group events and contentious events. This kind of project is more competitive, which exacerbates the students' eagerness to compete, and it is easy to neglect the protection of themselves and their opponents. This is more prone to sports injuries.

The main reason for the injury accidents of students in physical education is the lack of self-protection awareness, and the second is the aging of school grounds and equipment. Therefore, self-protection methods are taught in physical education classes to improve students' self-protection awareness. We need to speed up the update of sports equipment. It is essential to strengthening the pre-class inspection.

## CONCLUSION

The proportion of sports injuries among college students is relatively high. The proportion of personal injuries in extracurricular sports activities carried out by individual students is the highest, and the proportion of injuries in physical education is the lowest. The main reason for college students' sports injuries is their factors. The construction of the sports risk prevention and control mechanism in colleges and universities is not perfect. The awareness of sports risk prevention and control is lacking, and the relevant insurance purchase mechanism is not sound. The control measures and the maintenance and management of school sports facilities and facilities are better.

## ACKNOWLEDGMENT

This paper was supported by these projects:

1. 2016 Guangdong Youth Innovative Talents Project: Guangdong Lianshan minority sports.(NO: 2016WQNCX174).
2. 2016 quality engineering construction project of Sun Yat sen University of Electronic Science and technology:Research on the construction of Beishi curriculum of Minchuan project.(NO: JY201630).
3. National key project of the Ministry of Education:Research on micro curriculum design in College Physical Education.(NO: DCF130016).

The author declare no potential conflict of interest related to this article

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