CONSTRUCTION OF ANALYTICAL MODEL IN A COLLEGE STUDENTS' SPORTS TRAINING INJURIES

CONSTRUÇÃO DE UM MODELO ANALÍTICO PARA LESÕES NO TREINAMENTO ESPORTIVO DE ESTUDANTES UNIVERSITÁRIOS

CONSTRUCCIÓN DE UN MODELO ANALÍTICO PARA LESIONES DE ENTRENAMIENTO DEPORTIVO DE ESTUDIANTES UNIVERSITARIOS

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ABSTRACT

Introduction: College students often suffer from injuries in school sports activities. These injuries negatively influence the intellectual and motor learning curve. Thus, it is necessary to investigate and study the sports injuries of college students, their characteristics, and what are the most effective measures to reduce the occurrence of these complications. Objective: Develop an analytical model to verify the causes and solutions in the main injuries in student sports training. Method: The research used a self-administered questionnaire to obtain information about students' sports injuries. A random number was assigned to each class of each grade in the stratified group sampling method. Classification of causes was done according to the size of the random numbers found. Results: A total of 984 valid questionnaires were obtained (516 male). The injury rate was 53.9%. In all, 278 men and 167 women reported injuries, the injury rate was 35.7%. The injury rate in males in all grades was significantly higher. Conclusion: The results suggest that student awareness work on injury prevention is needed to reduce the incidence of sports complications. Physical education classes can strengthen technical guidance, improve awareness and mindfulness skills in students. It can also help them decrease the psychological stress of exercise, promoting the development of physical and mental health. ***Evidence Level II; Therapeutic Studies – Investigating the results.***

Keywords: Athletic Performance; Athletic Injuries; Students.

RESUMO

Introdução: Estudantes universitários frequentemente sofrem com lesões em atividades escolares esportivas. Essas lesões influenciam negativamente na curva de aprendizado intelectual e motor. Portanto, é necessário investigar e estudar as lesões esportivas dos estudantes universitários, suas características e quais as medidas mais eficazes para reduzir a ocorrência dessas complicações. Objetivo: Desenvolver um modelo analítico para verificar as causas e soluções nas principais lesões no treinamento esportivo de estudantes. Método: A pesquisa utilizou um questionário autoadministrado para obter informações sobre as lesões esportivas dos alunos. Foi atribuído um número aleatório a cada classe de cada série no método de amostragem de grupos estratificados. A classificação das causas foi feita de acordo com o tamanho dos números aleatórios encontrados. Resultados: Um total de 984 questionários válidos foi obtido (516 do sexo masculino). A taxa de lesões foi de 53,9%. Ao todo, 278 homens e 167 mulheres relataram ferimentos, a taxa de lesões foi de 35,7%. A taxa de ferimentos em homens, em todos os graus foi significativamente mais alta. Conclusão: Os resultados sugerem que é necessário um trabalho de conscientização nos estudantes sobre a prevenção de lesões para reduzir a incidência de complicações esportivas. As aulas de educação física podem fortalecer a orientação técnica, melhorar a capacidade de consciência e cuidado nos estudantes. Também podem ajuda-los a diminuir o estresse psicológico do exercício físico, promovendo o desenvolvimento da saúde física e mental. **Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.**

***Descritores*:** *Desempenho Atlético; Lesões Esportivas; Estudantes.*

RESUMEN

Introducción: Los estudiantes universitarios suelen sufrir lesiones en las actividades deportivas escolares. Estas lesiones influyen negativamente en la curva de aprendizaje intelectual y motor. Por lo tanto, es necesario investigar y estudiar las lesiones deportivas de los estudiantes universitarios, sus características y cuáles son las medidas más eficaces para reducir la aparición de estas complicaciones. Objetivo: Desarrollar un modelo analítico para verificar las causas y soluciones de las principales lesiones en el entrenamiento deportivo de los estudiantes. Método: La investigación utilizó un cuestionario autoadministrado para obtener información sobre las lesiones deportivas de los estudiantes. Se asignó un número aleatorio a cada clase de cada grado en el método de muestreo de grupo estratificado. La clasificación de las causas se hizo según el tamaño de los números aleatorios encontrados. Resultados: Se obtuvieron un total de 984 cuestionarios válidos (516 del sexo masculino). La tasa de lesiones fue del 53,9%. En total, 278 hombres y 167 mujeres declararon lesiones, la tasa de lesiones fue del 35,7%. La tasa de lesiones en los varones en todos los grados fue significativamente mayor. Conclusión: Los resultados sugieren que

es necesario realizar una labor de concienciación en los estudiantes sobre la prevención de lesiones para reducir la incidencia de las complicaciones deportivas. Las clases de educación física pueden reforzar la orientación técnica, mejorar la conciencia y la capacidad de atención de los alumnos. También pueden ayudarles a disminuir el estrés psicológico del ejercicio físico, promoviendo el desarrollo de la salud física y mental. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: Rendimiento Atlético; Traumatismos en Atletas; Estudiantes.

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INTRODUCTION

College students often suffer from injuries in sports competitions and training activities. Those who lightly influence learning and exercise, and seriously harm health and even endanger life, which is inconsistent with the original intention of our physical education and training.[1] Therefore, it is very necessary to investigate and study the sports injuries of college students from different angles and perspectives according to different situations, so as to sum up experience and lessons, find out the laws and characteristics of sports injuries, and take effective measures to reduce the occurrence of injuries and ensure the normal progress of university students' study and life.[2,3] With the national fitness campaign the development of sports venues and the changes in sports venues in colleges and universities have brought about new changes in the participation rate of college sports, and the number of sports injuries that have taken place has also increased.[4] The survey found that the lack of self-protection awareness and lack of self-protected motor skills during physical exercise have caused students to suffer from injuries.[5] Some items of fitness exercise have some inherent risk factors, and the increase in exercise intensity is accompanied by an increase in the risk of injury.[6] Wrong technical movements and increased speed can easily lead to injuries.[7] Environmental factors such as high fever or cold can also increase the risk of physical exercise. In addition, inappropriate use of sports equipment and facilities is also a high risk factor for all injuries. Sometimes sports injuries occur even with reasonable physical contact.[8] Previous studies have found that the incidence of injuries in physical education of ordinary college students is as high as 30% - 50%, which has a significant impact on the study and life of college students, understands the types and severity of sports injuries common to college students, and discusses the factors associated with the occurrence of sports injuries.[9] It is of great significance to formulate sports protection measures, prevent sports injuries, and focus the teaching of sports protection in the future.[10] This study uses a cross-sectional survey to understand the incidence of sports injuries and the characteristics of injuries among undergraduates of our school, and analyzes the relationship with the occurrence of sports injuries. Factors, with a view to providing protection for college students in the future sports injuries provide ideas and countermeasures.[11]

OBJECTS AND METHODS

Research object

All undergraduate students in our school are the subjects of the study. Using the method of stratified group sampling, we first assign 1 random number (random seed number: 329) to each class of each grade, and then rank according to the size of random numbers. In each grade, the random number of the minimum sample of the five most professional classes was distributed to the most sampled subjects. A total of 984 questionnaires were distributed, 930 valid questionnaires were returned, and the effective questionnaire recovery rate was 94.5%.

Research methods

The self-administered questionnaire survey was used to obtain information on the sports injuries of the subjects in the past year, including the first grade of the gender. The time of the injury, the participating sports, the location and extent of the injury, and the cause of the injury. The retest method was used to test the reliability of the questionnaire. The reliability coefficient was 0.958, which met the statistical requirements.

The function of sports training

On the basis of independent, voluntary and reciprocal mutual assistance, college students join college sports training camps and have corresponding rights and obligations. The college students' sports training camp has the functions of social, entertainment, fitness, will and development potential. In order to give full play to the role of sports training camp, promote the development of college students' sports activities, enrich the campus sports cultural life and improve the training level of the reserve talents of the college sports teams, the college students' sports training camp should use propaganda and exhibition boards to increase the students' fitness knowledge.

RESULTS

Different levels of sports injuries

A total of 984 valid questionnaires were obtained (of which 516 were boys. In the past year, 278 were injured, the injury rate was 53.9%; 468 were female, 167 were injured, and the injury rate was 35.7%. The injury rate of boys in all grades was significantly higher. For girls ($P<0.05$) (The highest injury rate was for first-year students, 54.9%, the lowest for fourth-grade students, 33.8%. The injury rate for lower grade students was significantly higher than that for higher grade students ($x^2= 35.675$, $P < 0.05$). (Table 1)

Occurrence time of college sports injury

The time of sports injuries was divided into extracurricular activities and physical education (including training sessions). Female students and male students suffered from sports injuries during extracurricular activities, accounting for 69.2% of all injuries. (Table 2)

Table 1. The Incidence of Sports Injuries among College Students of Different Grades.

Grade	Number of people surveyed	Number of injured	Injury rate (%)
First grade	293	161	54.9
Second grade	295	160	50.8
Third grade	239	81	33.9
Fourth grade	157	53	33.8
Total	984	454	45.2

Table 2. The Occurrence Time of Sports Injuries in Different Grades of College Students.

Grade	Extracurricular time (%)	Class time (%)
First grade	76.0	34.0
Second grade	63.3	36.7
Third grade	62.7	37.3
Fourth grade	64.2	35.8
Total	69.2	30.8

Injured parts of sports injuries

Knee joints were the most common injuries for boys and girls. Rapid offensive and defensive conversion and movement dodging in training need to quickly change the center of gravity and direction of movement. These will cause excessive inversion of the ankle joint and cause damage to the lateral ligament. Ankle joints often perform ultra-long-range movements. The acupoints and the joints of the talus do not coincide with each other, resulting in the phenomenon of "de-slotting" as well as the continuous rotation of the stone. Jumping, jumping and footwork movement in sports all require the knee joint to flex and stretch, and the length of the upper and lower ends of the knee joint must be long and the muscles around the knee must be protected. In this way, the knee joint is in the state of "long torque" and "small protection", joint instability is easily caused, resulting in incompatibility of the knee joint. With the iliac bone being stressed, it is easy to cause sacral injury. Causes meniscus injury mainly due to knee flexion, fixation of the lower leg in the abduction, external rotation, sudden adduction of the thigh, internal rotation and straightening of the knee joint, may cause damage to the medial meniscus, if the lower leg is fixed in the internal exhibition. When the thighs abruptly abducted, the rotation of the thighs and the rotation of the knee joints, it may also cause damage to the medial meniscus; and it may be accompanied by minor injury of the anterior cruciate ligament and the combined injury of the medial ligament tear and periosteum injury. Joint swelling and pain, can't continue to exercise. Finger injury is a kind of sports injury that occurs, when the finger is strongly impacted by the outside world. Before the exercise, it is necessary to fully prepare for the finger's preparation, such as finger pressing, finger winding, etc., or using a tape to reinforce the finger joint. They accounted for 46.3% of all injuries. Other common injuries were ankle (16.2%) and knuckles (16.0%). (Table 3)

Common types of college sports injuries

The common types of sports injuries for college students were bruises, sprains, bruises, and strains, the most common types of injuries, and the rates were similar; males suffered the greatest number of injuries (27.3%), and girls had the highest number of bruises (26.9%). (Table 4)

Sports activities for university students when they are injured

Football and basketball are the most common sports injuries for undergraduates. There are different types of sports injuries for male and female students in different genders. Boys have the highest basketball injury rate (33.5%), followed by football (31.3%). Female injuries are common. For football (25.7%), followed by track and field (25.1%). (Table 5)

Table 3. Distribution of Injured Parts of University Students with Different Genders.

Injured part	Boys (%)	Girls (%)	Total (%)
Ankle joint	40 (14.2)	32 (19.2)	72 (16.2)
Knee joint	115 (41.4)	91 (54.5)	206 (46.3)
Knuckle	56 (20.1)	15 (9.0)	71 (16.0)
Waist	26 (9.4)	18 (10.8)	44 (9.9)
Head	11 (4.0)	5 (3.0)	16 (3.6)
Other	30 (10.8)	6 (3.6)	36 (8.1)

Table 4. The distribution of injury types of college students with different genders.

Type of injury	Boys (%)	Girls (%)	Total (%)
Scratches	42 (15.1)	45 (26.9)	87 (19.6)
Contusion	53 (19.1)	37 (22.2)	90 (20.2)
Sprain	62 (22.3)	41 (24.6)	103 (23.1)
Strain	76 (27.3)	32 (19.2)	108 (24.3)
Fracture	18 (6.5)	4 (2.4)	22 (4.9)
Other	27 (9.7)	8 (4.8)	35 (7.9)

Analysis of College Students' Sports Injuries

The main cause of injury was paralysis (57.5%). It was the highest among boys (55.0%) and girls (61.7%), followed by inadequate preparations. The more common causes of female injury were technical errors (40.7%) and constitutional reasons (43.1%), which were significantly higher than boys (33.8%, 14.0%). It is noteworthy that the stress of female students was significantly higher (20.4%) than boys (9.0%). (Table 6)

Table 5. Distribution of Injured Parts of University Students with Different Genders.

Sports items	Boys (%)	Girls (%)	Total (%)
Football	87 (31.3)	43 (25.7)	130 (29.2)
Basketball	93 (33.5)	37 (22.2)	130 (29.2)
Track and field	65 (23.4)	42 (25.1)	107 (24.0)
Volleyball	21 (7.6)	26 (15.6)	47 (10.6)
Total	12 (4.3)	19 (11.4)	31 (7.0)

Table 6. Reasons for Injuries of University Students of Different Genders.

Cause of injury	Boys (%)	Girls (%)	Total (%)
Numbness	153 (55.0)	103 (61.7)	256 (57.5)
Insufficient preparation	132 (47.5)	94 (56.3)	226 (50.8)
Technical errors	94 (33.8)	68 (40.7)	162 (36.4)
Institutional reasons	39 (14.0)	72 (43.1)	111 (24.9)
Site equipment reasons	42 (15.1)	21 (12.6)	63 (14.2)
Nervous	25 (9.0)	34 (20.4)	59 (13.3)
Other	21 (7.6)	13 (7.8)	34 (7.6)

DISCUSSION

Analysis of the Causes of University Students' Sports Injuries

Insufficient attention is paid to the idea of sports injuries. The occurrence of sports injuries is often associated with the lack of awareness of the importance of physical education teachers, coaches, and physical exercisers in the prevention of sports injuries, mental paralysis, and failure to actively adopt effective preventive measures. There is a lack of reasonable preparation activities. Without a preparation activity, intense physical activity is carried out. Because muscles and ligaments do not have enough strength and extensibility, they are still in a rigid state and are prone to sports injuries. Inadequate preparation activities, nervous system and the function of various organ systems have not yet reached the appropriate level, and it is also prone to sports injuries. Some students, due to their poor muscle strength and flexibility, the joints are also less flexible and stable, and due to improper training, they are easily injured. Poor physical fitness and technical movements are not standardized. Poor physical fitness is the fundamental factor that leads to sports injuries. Physical exercise environment such as venues, equipment, climate, clothing and other factors can also cause sports injuries, especially the site is too hard (cement), water and other rain is more likely to cause sports injuries.

The student's psychological state is also closely linked to sports injuries. Students who are depressed, in a bad mood, timid or depressed, or who are less motivated may become the cause of sports injuries.

Suggestions for preventing sports injuries

Both the physical education teacher and the student should firstly attach importance to the prevention of sports injuries ideologically, define the significance and purpose of preventing injuries, and effectively use protection and help in physical education, training, and competition. Students have a good and strong heart and strive to develop individual confidence in sports and sports activities. Emphasizing the self-protection consciousness is an indispensable part of the teacher's physical education content, and the technical actions, site environment, and exercise

intensity that may be damaged should be explained frequently. The purpose of the preparation activities is to allow the nervous system and various organ systems to reach a level suitable for exercise, and to allow muscles and ligaments to fully stretch and activate, to be fully prepared for intense exercise. The content of the preparation activities should be based on the content of teaching, training and competition depends on both the general preparation activities and the special preparation activities. In addition, it is closely related to special items and should have special preparation activities for the more burdensome and easily injured parts of the exercise. The active and passive extension of the ligaments around the joints allows the part of the force to open. When engaged in a certain sport, it must be fully prepared for psychological and physical activities. A survey of more than 900 injured students found that 82% of the injuries were caused by violent activities due to lack of preparation. Preparation activities can promote the function of the heart and other organs to gradually adapt to the needs of exercise, increase body temperature and muscle temperature, increase skeletal muscle metabolism, blood flow and oxygen transport, reduce resistance to muscle activity, and increase the strength and elasticity of ligaments. Protection and self-protection are important means to prevent sports injuries. Appropriate protection and help in sports can strengthen students' confidence and avoid accidents. Teachers should protect their own personal protection besides protection. The correct method of self-protection is taught to students. There is sufficient evidence to prove that the use of high-intensity exercise, exercise time is more than 40 min, and the number of exercise per week is greater than 4 times, resulting in increased risk of injury such as sprinting caused by periostitis. Achilles tendinitis, etc.

The school regularly responds to students' physical examinations according to conditions, establishes students' physical fitness cards, and incorporates student files. Schools should plan to build new venues, repair equipment and regularly organize inspections or update venue equipment, exercise equipment, and improve the physical exercise environment.

Construction of Analytical Model of Undergraduates' Training Injuries Based on the results of the above investigation and analysis of the causes of undergraduate training, the types of ankle joints, knee joints, knuckles, waists, heads, and other injuries in college students' injured parts, as well as the types of sports injuries among college students, are scattered, sprained, contused, pull injuries, fractures, and other types of college sports are distributed in football, basketball, athletics, volleyball, and others. Finally, the reasons for training injuries are numbness, inadequate preparation, technical errors, reasons for venue equipment, mental stress, and other models. The construction of the specific model is shown in Figure 1 below.

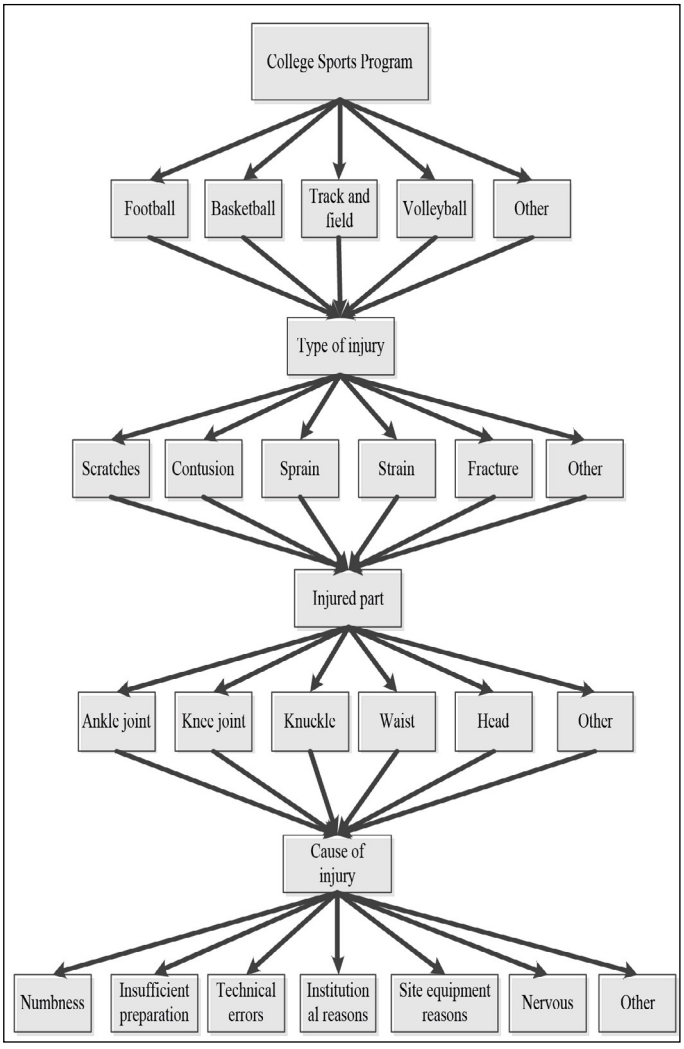

Figure 1. College Students' Sports Training Cause Analysis Model Diagram.

CONCLUSION

In the analysis of the causes of sports injuries among college students of different genders, the main causes of injury for boys and girls are paralyzed. The results suggest that it is necessary to improve students' awareness of the prevention of ideas and self-protection in order to prevent paralysis and reduce the incidence of sports injuries. Adequate preparation activities help to stretch and stimulate muscles, increase body temperature, reduce the excitability of the central sympathetic nerve, thereby ensuring that the visceral function is inert, the muscle viscosity is reduced, and the joints are stretched to facilitate the movement of the human body. The students' awareness of self-protection and self-protection in sports may not lead to a high incidence of accidents. This study found that girls' technical errors resulted in significantly higher sports injuries than boys, combined with girls' low participation in physical education and insufficient experience in physical activity. It was also found that girls accounted for nearly half of the physical causes of physical injury, and that the proportion of boys was not very high. It has also been found that mental stress factors are responsible for the causes of sports injuries in girls. With little experience in refining, girls' physical, mental and other special factors cause them to face greater pressure in the face of academic, economic, interpersonal, family, love, and other aspects. Therefore, in future, through some psychological counseling and other methods to ease the psychological burden of students, ease the possible anxiety, so that college girls can better participate in sports, promote the joint development of physical and mental health.

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