RESEARCH ON THE CAUSES OF SPORTS INJURIES AND REHABILITATION IN UNIVERSITY PHYSICAL TRAINING

PESQUISA SOBRE AS CAUSAS DE LESÕES ESPORTIVAS E REABILITAÇÃO NO TREINAMENTO FÍSICO UNIVERSITÁRIO

INVESTIGACIÓN SOBRE LAS CAUSAS DE LESIONES DEPORTIVAS Y REHABILITACIÓN EN EL ENTRENAMIENTO FÍSICO UNIVERSITARIO

ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

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ABSTRACT

Introduction: College students represent a large proportion of amateur athletes in China. In sports practices, some unavoidable situations lead to physical injuries that can seriously affect the daily life of these students. Formulating rehabilitation plans to avoid secondary complications and speed up the students' return to their daily activities is necessary. Objective: To study the causes of sports injuries and the effect of sports rehabilitation on university physical training. Methods: Through questionnaires and interviews, 720 students and 25 teachers with a history of sports injuries were selected to investigate the causes of students' sports injuries. Then, 20 volunteers were selected as research subjects. They received a rehabilitation training protocol three times a week for six weeks. EMG signals of the athletes' shoulder and neck muscles were measured. Results: Sports injury is an inevitable problem during college physical training. Training joint flexibility and stability can effectively improve the surface EMG signals in the area adjacent to the joint to improve muscle strength and joint amplitude level. Conclusion: Students should consciously undertake rehabilitation training under professional guidance and receive full instruction in sports rehabilitation procedures involving a combination of physical and psychological recovery. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Education; Higher; Physical Education and Training; Injuries, Sports.

RESUMO

Introdução: Estudantes universitários representam grande parte dos esportistas amadores na China. Nas práticas esportivas, algumas situações inevitáveis acarretam em lesões físicas que podem afetar seriamente o cotidiano desses alunos. Faz-se necessária a formulação de planos de reabilitação afim de evitar complicações secundárias e agilizar o retorno dos estudantes às suas atividades diárias. Objetivo: Estudar as causas de lesões esportivas e o efeito da reabilitação esportiva no treinamento físico universitário. Métodos: 720 alunos e 25 professores com histórico de lesão esportiva foram selecionados para investigar as causas de lesão esportiva dos alunos por meio de questionário e entrevista. Em seguida, foram selecionados 20 voluntários como objeto de pesquisa. Esses receberam um protocolo de treinamento em reabilitação três vezes por semana, durante 6 semanas. Foram mensurados os sinais EMG dos músculos do ombro e pescoço dos atletas. Resultados: A lesão esportiva é um problema inevitável durante o treinamento físico universitário. Treinar a flexibilidade e estabilidade articular pode efetivamente melhorar os sinais EMG de superfície na área adjacente à articulação, de modo a melhorar a força muscular e o nível de amplitude articular. Conclusão: Os alunos devem realizar conscientemente treinamento de reabilitação sob orientação profissional, além de receberem instrução plena sobre os procedimentos da reabilitação esportiva, envolvendo uma combinação de recuperação física e psicológica. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Educação Superior; Educação Física e Treinamento; Lesões Esportivas.*

RESUMEN

Introducción: Los estudiantes universitarios representan una gran parte de los deportistas aficionados en China. En las prácticas deportivas, algunas situaciones inevitables provocan lesiones físicas que pueden afectar gravemente a la vida cotidiana de estos alumnos. Es necesario formular planes de rehabilitación para evitar complicaciones secundarias y acelerar el regreso de los alumnos a sus actividades cotidianas. Objetivo: Estudiar las causas de las lesiones deportivas y el efecto de la rehabilitación deportiva en el entrenamiento físico universitario. Métodos: Se seleccionaron 720 estudiantes y 25 profesores con antecedentes de lesiones deportivas para investigar las causas de las lesiones deportivas de los estudiantes mediante un cuestionario y una entrevista. A continuación, se seleccionaron 20 voluntarios como sujetos de la investigación. Recibieron un protocolo de entrenamiento de rehabilitación tres veces por semana, durante 6 semanas. Se midieron las señales EMG de los músculos del hombro y del cuello de los atletas. Resultados: Las lesiones deportivas son un problema inevitable durante el entrenamiento físico universitario. El entrenamiento de la flexibilidad y la estabilidad articulares pueden mejorar eficazmente las señales EMG superficiales en la zona adyacente a la articulación, de modo que se mejore la fuerza muscular y el nivel de amplitud articular. Conclusión: Los estudiantes deben realizar conscientemente un entrenamiento de rehabilitación bajo la dirección de

un profesional, y recibir una instrucción completa en los procedimientos de rehabilitación deportiva que impliquen una combinación de recuperación física y psicológica. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Educación Superior; Educación y Entrenamiento Físico; Lesiones Deportivas.*

DOI: http://dx.doi.org/10.1590/1517-8692202329012022_0261 Article received on 04/24/2022 accepted on 05/20/2022

INTRODUCTION

With the rapid development of China, people have reached a certain height from the ideological level. Many people pay more attention to physical health problems, respond to the call of national fitness and participate in sports.[1] After long-term development, the number of sports lovers in China is huge, and college students are an important part of the number of sports lovers in China. Due to the lack of relevant knowledge, students' sports intensity is different, their technical level is different, and the types of projects are widely involved. When college students carry out sports, some sports emergencies can not be avoided, resulting in students' sports injuries.[2] Different types of college students have caused different degrees of physical injury. Individual serious types of sports injuries have seriously affected students' daily life.[3] Guiding students how to effectively avoid sports injury and how to effectively and correctly exercise training to reduce the probability of injury has become the task of College Physical Education Teachers' guidance team.[4] Physical education teachers conduct safety education and guidance for students' training in different links before, during and after sports, and carry out relevant safety courses to reduce the probability of students' injury in sports and enable students to carry out a series of activities such as physical training in a safe environment.[5] Next, for students who have suffered from sports injuries. We should study and analyze the types and severity of injuries, formulate sports rehabilitation plans, and guide them how to effectively carry out sports rehabilitation and correct rehabilitation methods, so as to avoid secondary injury to the body caused by the wrong rehabilitation methods.[6] Summarize the experience of students' injuries and establish a sports rehabilitation system in Colleges and universities. Help students reduce the life impact of injuries and improve the overall health of college students.

METHOD

In order to explore the causes of sports injury in college physical training, this paper analyzes it from two aspects: teachers and students. Firstly, 720 students with a history of sports injury were selected as the research object to make data statistics on the location and type of sports injury. The study and all the participants were reviewed and approved by Ethics Committee of Shangqiu University (NO. 19SQUNSD06). Then it analyzes the causes of students' sports injury. Based on a certain understanding of the current situation of students' sports injury, it conducts a questionnaire survey and interview with 25 teachers to explore the causes of students' sports injury based on the perspective of teachers, and uses Excel software to sort out and analyze the data.

In order to explore the effect of sports rehabilitation on the recovery of sports injury in college sports training, according to the principle of complete voluntariness, this paper selects 20 volunteers as the research object, and carries out rehabilitation training three times a week. The content is mainly flexibility and stability training, including but not limited to supraspinatus muscle traction, pectoralis minor muscle traction, sitting rowing practice, lateral shoulder external rotation and so on. The rehabilitation experiment lasted for 6 weeks. Before and after the experiment, the EMG signals of athletes' shoulder and neck muscles were measured by wireless surface EMG equipment, so as to explore the intervention effect of rehabilitation training on sports injury.

RESULTS

Types and causes of sports injury

From a macro perspective, sports injury can be divided into two categories: acute sports injury and chronic sports injury. For students, most acute sports injuries are caused by strenuous exercise. Or insufficient warm-up, sudden force, resulting in sudden strong stress on the stressed tissue, resulting in sports tissue damage. Acute sports injury is common in ball games, such as sprain, strain, ligament tear, Achilles tendon rupture and so on. It is also common in the fracture and fracture of fighting events. Chronic sports injury is the injury caused by the cumulative exercise burden of long-term exercise, or the chronic sports injury caused by congenital tissue diseases. Most of the chronic injuries are caused by long-term force errors and non-standard exercise methods, which accumulate to a certain extent, and then appear the injury problem. The common cases are periarthritis of shoulder, tendinitis, synovitis and other chronic sports injuries.

As shown in Table 1, all kinds of sports injuries can be divided into: skin injury, which is usually human epidermal contusion. Muscle injury, usually muscle strain and muscle tear. Tendon and ligament injuries, such as ligament strain, ligament tear, Achilles tendon rupture and so

Table 1. Types of sports injury.

Site	Type	Number of injured	Proportion
Neck	Neck sprain	41	5.694%
	Brow bone injury	18	2.500%
	Nasal fracture	10	1.389%
Shoulder	Muscle strain	46	6.389%
	Fracture	11	1.528%
	Dislocation	15	2.083%
	Tendon break	8	1.111%
Hand	Dislocation	16	2.222%
	Fracture	17	2.361%
	Sprain	58	8.056%
	Bruise	30	4.167%
	Tendon break	9	1.250%
Waist	Lumbar muscle strain	56	7.778%
	Lumbar	31	4.306%
knee	Inner ligament of the knee broken	17	2.361%
	The outer ligament of the knee is broken	9	1.250%
	Inner ligament strain of the knee	36	5.000%
	Needle outer ligament strain	27	3.750%
	Half -moon board injury	47	6.528%
	Joint edema	47	6.528%
Ankle	Achilles tenditis	14	1.944%
	Achilles tendon break	14	1.944%
	Ankle sprains	85	11.806%
	Fracture	16	2.222%
	Toe step on the injury	30	4.167%
	Feet bone fracture	12	1.667%

on. Joint injuries, such as joint sprain and joint dislocation, are common. Cartilage injury, usually meniscus injury. Bone injury, commonly fracture, bone fracture, etc. Nerve injury, commonly facial nerve injury and cervical nerve injury.

According to the severity of injury, it can be divided into: light injury, that is, simple disinfection treatment. Moderate injury requires a period of tissue recovery time. Severe injury: surgical treatment is required. Minor sports injury recovered through treatment, which had no effect on daily life in the future; Surgery will cause serious injury to daily life, and even cause serious injury to daily life.

The causes of sports injury were investigated from the perspective of students. The survey results of 720 students are shown in Figure 1. Among them, 177 students believed that "excessive exercise intensity" was the main cause of injury, accounting for 24.583%, ranking first; For the problem of "slackness and perfunctory during relevant warm-up and relaxation actions", 134 students thought it was the main cause of injury, accounting for 18.611%, ranking second; For the problem of "insufficient concentration of their own energy", 113 students thought it was the main cause of injury, accounting for 15.694%, ranking third; For the problem of "being in the stage of physical discomfort or excessive fatigue", 99 students thought it was the main cause of injury, accounting for 13.750%, ranking fourth; For the "insufficient mastery of motor skills", 98 students thought it was the main cause of injury, accounting for 13.611%, ranking fifth. In addition, "the clothes worn during sports are inappropriate", accounting for 4.722%, and "lack of necessary protection awareness during sports", accounting for 9.028%, which will cause certain sports injuries.

It can be seen that adequate warm-up preparation can make the body quickly enter the state of movement, open the body activity, improve the activity of the nervous system and promote the secretion of positive acting hormones. At the same time, it can improve the flexibility of muscles, ligaments and other tissues, and avoid strain and tear of soft tissue under stress. The warm-up also improves the flexibility of each joint, makes the joint meet the basic requirements of the motion state, and avoids all kinds of joint damage caused by movement. In addition, many students because the intensity of exercise is higher than their physical ability. Excessive pursuit of exercise intensity leads to insufficient body support and sports demand, resulting in injury. Individual students do not check in time after sports injury, but continue to exercise with pain, often resulting in secondary injury. Some students do not wear relevant protective equipment in a standardized way, or even carry out some sports with high risk coefficient without any protective equipment. Therefore, we should cultivate self-protection awareness and learn more safety knowledge in order to effectively avoid these problems.

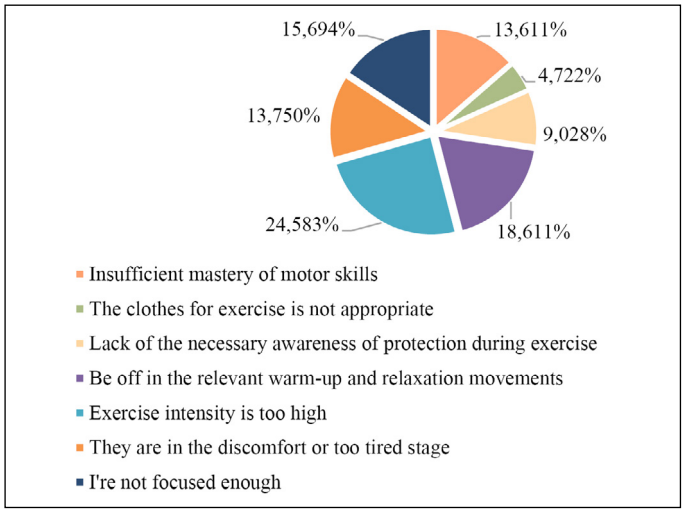

Figure 1. Analysis on the causes of sports injury based on the perspective of students.

The causes of sports injury were investigated from the perspective of teachers. The survey results of 25 teachers are shown in Figure 2. Among them, 7 teachers believe that students do not cooperate and pay attention to themselves. This option ranks first, accounting for 28.000%; Five teachers believed that the curriculum design was not scientific and reasonable, and this option ranked second, accounting for 20.000%; Four teachers believed that the curriculum plan was inconsistent with the actual ability of students. Four teachers believed that the lack of comprehensive protection in classroom teaching led to omissions. These two options ranked third in parallel, accounting for 16.000%. In addition, "in order to save class time and reduce the length of warm-up exercise", accounting for 8.000%, and "students have physical or psychological discomfort", accounting for 12.000%, which will also cause certain sports injuries. Because most of the students participate in sports because of their hobbies. The lack of professional training guidance leads to the immature technology, the technical action does not meet the standard requirements, resulting in all kinds of joint sprains, the usual exercise intensity is unreasonable, and some students fail to meet the requirements because of their strength. Good strength can effectively avoid injuries in sports. Lack of sports related knowledge and bad sports habits are the main reasons for sports injury.

Effect analysis of sports rehabilitation

This experiment analyzed the intervention effect of relevant rehabilitation training on 20 student volunteers with shoulder joint injury. After 6 weeks of rehabilitation training three times a week, the results of sEMG signals during arm lifting before and after training were sorted and analyzed.

Taking the arm lifting movement as an example, this paper discusses the effect of rehabilitation training by sorting and analyzing the RMS results before and after rehabilitation training. As shown in Table 2, after rehabilitation training, the RMS of pectoralis major increased from (233.742 ± 123.682) to (239.680 ± 97.752), the RMS of biceps brachii increased from (271.827 ± 135.703) to (280.997 ± 157.773), the RMS of

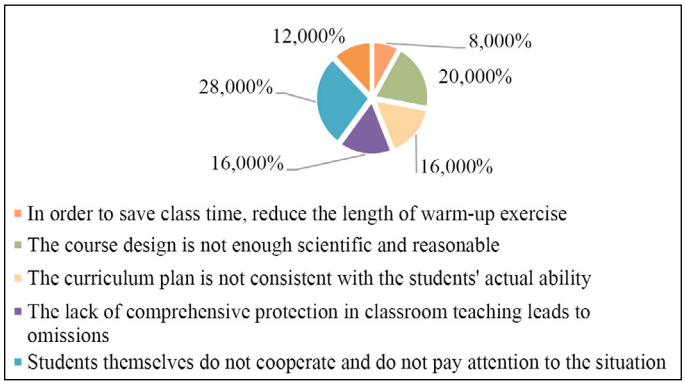

Figure 2. Analysis on the causes of sports injury from the perspective of Teachers.

Table 2. Effect of rehabilitation training on RMS results of arm lifting.

Muscle	Before training	After training	P
Pectoralis	233.742±123.682	239.680±97.752	P>0.05
Biceps	271.827±135.703	280.997±157.773	P>0.05
Triceps	245.897±158.482	256.279±129.037	P>0.05
Trapezard muscle	283.001±152.021	290.895±163.713	P>0.05
Under the trapezius muscle	178.544±90.749	283.893±173.135	P<0.01
Trapezius	191.579±84.152	226.312±104.450	P>0.05
Latry	185.344±145.432	192.640±125.749	P<0.05
Anterior sawtomy	125.376±61.225	248.975±141.142	P<0.01
Triangular back	268.148±162.165	272.813±152.284	P>0.05
Trigmond muscle bouquet	290.443±149.851	306.481±188.354	P>0.05

triceps brachii increased from (245.897 ± 158.482) to (256.279 ± 129.037), the RMS of trapezius superior increased from (283.001 ± 152.021) to (290.895 ± 163.713), and the RMS of trapezius increased from (191.579 ± 84.152) to (226.312 ± 104.450), The RMS of the posterior deltoid bundle increased from (268.148 ± 162.165) to (272.813 ± 152.284), and the RMS of the anterior deltoid bundle increased from (290.443 ± 149.851) to (306.481 ± 188.354) ($P > 0.05$). RMS of latissimus dorsi increased from (185.344 ± 145.432) to (192.640 ± 125.749), $P < 0.05$, indicating that there was a significant difference. The RMS of inferior trapezius muscle increased from (178.544 ± 90.749) to (283.893 ± 173.135), and that of anterior serratus muscle increased from (125.376 ± 61.225) to (248.975 ± 141.142) ($P < 0.01$).

Through integration and analysis, it can be seen that after six weeks of rehabilitation training, although there are different P values in the changes of shoulder and neck muscles during arm lifting, they all show an upward trend as a whole, which shows that rehabilitation training can systematically exercise shoulder and neck muscles, so as to make the surface electromechanical signals more active and achieve the effect of improving muscle strength and joint level. Therefore, relevant rehabilitation training is very effective and worthy of being extended to the rehabilitation process of other sports injuries.

DISCUSSION

Rehabilitation behavior measures for injured students

Due to the different degrees of injury in sports, it is inevitable to be injured in sports. When we have injuries, every college student needs to learn how to recover. In case of sports injury, timely seek medical examination to find out the specific situation. You can't judge your injury according to your own experience. Try not to touch the injured part to avoid similar fractures. This situation is very likely to cause secondary injury. It is also possible to determine whether there are specific requirements for the recovery of diet and drugs after exercise, because it is also possible to maintain a good effect. Properly supplement vitamins, proteins and other nutrients, and refuse irritating foods, such as hemp, spicy, oil and so on. In case of sprain, cold and hot compress and other related operations should be carried out in time. This practice is very beneficial to detumescence and pain relief. After detumescence, the injured part can be kneaded with light force, which is conducive to the rapid recovery of the injured part. Communicate with the doctor in time and follow the doctor's advice. Give feedback to the doctor on the recovery and let the doctor judge. For the problem of bone injury, calcium should be supplemented in time and cooperate with the prescription prescribed by the doctor. Have a regular and reasonable work and rest time.

Auxiliary rehabilitation measures of professional teams in Colleges and Universities

Colleges and universities should have professional teams to assist students in injury rehabilitation. Professional teams should pay attention to standardizing technical actions when students enter school, cultivate students' awareness of self safety, and enable students to develop good sports habits. For injured students, relevant rehabilitation plans should be formulated according to the suggestions of doctors. The school should offer relevant safety courses to guide students to take first-aid measures in case of emergency, which can effectively reduce the injury to students.

CONCLUSION

Sports injury is an inevitable problem for college physical training, which can only be improved through certain preventive measures and effective rehabilitation measures. The results show that the flexibility and stability training of the joint can effectively improve the surface EMG signals of the muscles in the joint, so as to improve the muscle strength and joint level, and achieve the effect of alleviating sports injury. Therefore, students should consciously carry out rehabilitation training under the advice of doctors. Teachers also need to fully learn medical knowledge and provide better sports rehabilitation teaching for students in combination with physiological and psychological aspects.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript: Every author has made an important contribution to this manuscript. WL and BM: writing and execution.

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