

PREVENTION, INTERVENTION, AND MANAGEMENT OF PHYSICAL TRAINING IN THE REHABILITATION OF LOWER LIMB INJURIES



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PREVENÇÃO, INTERVENÇÃO E GERENCIAMENTO DO TREINAMENTO FÍSICO NA REABILITAÇÃO DE LESÕES NOS MEMBROS INFERIORES

PREVENCIÓN, INTERVENCIÓN Y GESTIÓN DEL ENTRENAMIENTO FÍSICO EN LA REHABILITACIÓN DE LESIONES DE LOS MIEMBROS INFERIORES

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ABSTRACT

Introduction: Lower limb injuries are one of the main sports occurrences among athletes. Severe lower limb injuries will lead to the definitive end of the athlete's professional career. **Objective:** Explore the mechanisms of prevention and intervention against lower limb injuries in physical training and the rehabilitation management strategies for lower limb injuries. **Methods:** In this study, 20 athletes were selected. Comparing the results of the lower limb FMS test and balance y test before and after rehabilitation training management, the effect of rehabilitation management on recovery from lower limb injuries in physical training was discussed. **Results:** Lower limb injury is a common type of sports injury in physical training; however, better recovery utilization can be achieved through successful rehabilitation training. Rehabilitation training management can effectively improve the FMS test score of athletes' lower limbs and the number of people who passed the Y balance test. However, the existing rehabilitation training program still has some limitations, which need to be corrected according to the individual conditions of athletes. **Conclusion:** Through physical training and medical rehabilitation, athletes with lower limb injuries can recover their lower limb sports ability and prolong their sporting life. Therefore, it should be disseminated. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Athletic Injuries; Primary Prevention; Rehabilitation.

RESUMO

Introdução: A lesão nos membros inferiores é uma das principais ocorrências esportivas entre os atletas. Lesões graves nos membros inferiores levarão ao encerramento definitivo da carreira profissional do atleta. **Objetivo:** Explorar os mecanismos de prevenção e intervenção contra lesões dos membros inferiores no treinamento físico e as estratégias de gerenciamento de reabilitação para lesões dos membros inferiores. **Métodos:** Neste trabalho, 20 atletas foram selecionados. Por meio da comparação dos resultados do teste FMS de membros inferiores e do teste de equilíbrio y antes e depois do gerenciamento do treinamento de reabilitação, foi discutido o efeito do gerenciamento de reabilitação na recuperação de lesões dos membros inferiores no treinamento físico. **Resultados:** A lesão dos membros inferiores é um tipo corriqueiro de lesão esportiva no treinamento físico, porém um melhor aproveitamento da recuperação pode ser alcançado através de um treinamento de reabilitação bem-sucedido. O gerenciamento do treinamento de reabilitação pode efetivamente melhorar a pontuação do teste FMS dos membros inferiores dos atletas e o número de pessoas que passaram no teste de equilíbrio Y. Entretanto, o programa de treinamento de reabilitação existente ainda apresenta algumas limitações, que precisam ser corrigidas de acordo com as condições individuais dos atletas. **Conclusão:** Através da combinação de treinamento físico e reabilitação médica, os atletas com lesão nos membros inferiores podem recuperar sua capacidade esportiva nos membros inferiores e prolongar uma vida esportiva. Portanto, convém difundi-lo. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Traumatismos em Atletas; Prevenção Primária; Reabilitação.

RESUMEN

Introducción: Las lesiones en los miembros inferiores son uno de los principales sucesos deportivos entre los atletas. Las lesiones graves en los miembros inferiores conducirán al final definitivo de la carrera profesional del atleta. **Objetivo:** Explorar los mecanismos de prevención e intervención contra las lesiones de los miembros inferiores en el entrenamiento físico, y las estrategias de gestión de la rehabilitación de las lesiones de los miembros inferiores. **Métodos:** En este estudio se seleccionaron 20 atletas. Mediante la comparación de los resultados de la prueba de FMS de las extremidades inferiores y la prueba de equilibrio y antes y después de la gestión del entrenamiento de rehabilitación, se analizó el efecto de la gestión de la rehabilitación en la recuperación de las lesiones de las extremidades inferiores en el entrenamiento físico. **Resultados:** Las lesiones en las extremidades inferiores son un tipo de lesión deportiva común en el entrenamiento físico, sin embargo, se puede lograr una mejor utilización de la recuperación mediante un entrenamiento de rehabilitación exitoso. La gestión del entrenamiento de rehabilitación puede mejorar eficazmente



las puntuaciones de los atletas en las pruebas de FMS de las extremidades inferiores y el número de personas que superan la prueba de equilibrio Y. Sin embargo, el programa de entrenamiento de rehabilitación existente sigue teniendo algunas limitaciones, que deben corregirse en función de las condiciones individuales de los deportistas. Conclusión: Mediante la combinación de entrenamiento físico y rehabilitación médica, los atletas con lesiones en las extremidades inferiores pueden recuperar su capacidad deportiva y prolongar su vida deportiva. Por lo tanto, debe difundirse. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Traumatismos en Atletas; Prevención Primaria; Rehabilitación.

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INTRODUCTION

In the training activities of athletes, due to the need to train for sports with high intensity, and the high proportion of lower limbs in various sports activities, the requirements for lower limb strength are higher. The strength of lower limbs will also be relatively high in normal training, and higher training intensity may bring a lot of sports injury problems.¹ In the sports injuries of lower limbs, the common types are: Sports skin injury, joint injury, soft tissue injury, and sports injuries such as fracture and bone fracture caused by strong stress.² In the process of training, there may be high training intensity, intense physical confrontation may occur in antagonistic training, and there may be more physical contact between athletes. High intensity antagonistic training and sports contact may lead to technical movement deformation, and then lead to lower limb sports injury.³ The sports injury of lower limbs in the training process is unpredictable, and the occurrence of injuries is usually sudden, which requires that the trainers and auxiliary personnel should make full preparations in advance, and the trainers should adjust the standard technical actions to improve their self-protection awareness.⁴ In order to prevent sports injury, ensure the efficiency and safety of training, so as to prolong the athletes' sports career. In the training process, athletes need the cooperation of coaches to arrange reasonable training content and adapt to the training intensity plan.⁵ And coaches should timely guide athletes' training theoretical knowledge, cultivate athletes' self-protection awareness, avoid athletes' training in the state of fatigue during training, and prevent sports injuries caused by insufficient strength. For athletes who have suffered from lower limb sports injury, they should take doctor's advice for rehabilitation treatment.⁶ Refuse to make blind self judgment to avoid secondary sports injury, and avoid the extension of rehabilitation time and weakening of rehabilitation degree caused by wrong judgment. Unscientific practices in the process of rehabilitation may bring permanent sports injury to athletes. In order to reduce the impact of sports injury on Athletes' career, this paper discusses the effect of rehabilitation training on Athletes' lower limb injury from the two aspects of physical training intervention and rehabilitation management, and puts forward corresponding preventive measures and rehabilitation strategies.

METHOD

In order to understand the current situation of lower limb injury in physical training, this paper first analyzes whether the athletes have suffered from lower limb injury, the specific name of the disease and the causes of lower limb injury by using the method of questionnaire. In this paper, a questionnaire survey was conducted to the student athletes of Physical Education Majors in different colleges and universities in the form of online. A total of 642 valid questionnaires were obtained, of which 378 people had lower limb injuries, and the lower limb injury rate was 58.88%.

In order to know more about the rehabilitation management of lower limb injury in physical training, this paper uses the experimental

method to select 20 athletes. The study and all the participants were reviewed and approved by Ethics Committee of Changzhou University (NO.19CZUN26-SR). By comparing the FMS test results of lower limbs before and after rehabilitation training management with the y-balance test results, this paper discusses the recovery effect of rehabilitation management on lower limb injury in physical training.

The rehabilitation management experiment lasted for 9 weeks. After measuring the relevant data, 20 athletes added the content of rehabilitation training after the daily training.

RESULTS

Lower limb injury in college physical training and its causes

First of all, through the way of questionnaire survey, this paper investigated 378 college students majoring in physical education, and analyzed the situation of athletes' lower limb injury and the causes of lower limb sports injury.

Figure 1 shows the lower limb injuries of sports training athletes. Assume that diseases with a prevalence of more than 10% are common lower limb injuries, and rank the common lower limb injuries according to their frequency. The number of patients with quadriceps femoris strain and contusion was 78, the prevalence rate was 20.63%, which was the most common problem of lower limb injury; The number of patients with ankle ligament injury was 67, the prevalence rate was 17.72%, ranking the second; The number of patients with tendinopathy was 59, with a prevalence rate of 15.61%, ranking the third; The number of patients with knee ligament injury was 54, with a prevalence rate of 14.29%, ranking the fourth. It can be seen from the investigation that the most common cases of athletes' lower limb injuries in physical training are strain, contusion and ligament injury. These symptoms can be recovered relatively through certain rehabilitation management, with fewer sequelae and less impact on the follow-up of athletes. The proportion of relatively serious bone injuries is relatively low. For example, the number of patients with knee cartilage injury is 11, and the prevalence rate is 2.91%; The number of patients with ankle cartilage injury was 9, and the prevalence rate was 2.38%; The number of patients with epiphysitis of tibial tubercle was 15, and the prevalence rate was 3.97%. It can be seen

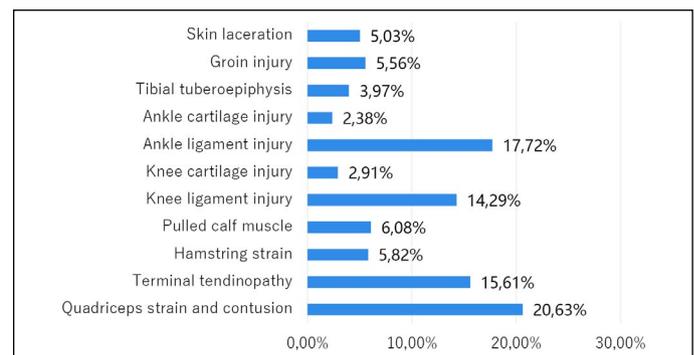


Figure 1. Lower limb injuries of athletes in physical training.

from this that although the proportion of athletes' lower limb injuries is high, the overall injury is not serious, and a good recovery effect can be achieved through effective rehabilitation management.

Figure 2 shows the causes of sports injury of lower limbs of sports training athletes. Set the causes with a frequency of more than 10% as the common causes of lower limb injury, and rank the common causes of lower limb injury according to the frequency of occurrence. The number of sports injuries caused by lack of warm-up training was 84, accounting for 22.22%, which was the most common problem of lower limb injury; The number of sports injuries caused by long-term strain was 77, accounting for 20.37%, ranking the second; The number of sports injuries caused by existing injuries was 55, accounting for 14.55%, ranking the third; The number of sports injuries caused by incorrect posture was 48, accounting for 12.70%, ranking the fourth; The number of sports injuries caused by excessive fatigue was 38, accounting for 10.05%, ranking fifth.

Effect of rehabilitation training management on the recovery of athletes' lower limb injuries

Through the investigation of athletes' lower limb injuries, it can be seen that most of the lower limb injuries can achieve good recovery effects through certain rehabilitation training. In order to explore the effect of rehabilitation training management combining physical training and medical rehabilitation on the recovery of athletes' lower limb injuries, this section takes the FMS test results of athletes' lower limbs and the passing results of athletes' y-balance test as indicators for analysis and discussion.

It can be seen from Table 1 that rehabilitation training management can effectively improve the score of athletes' lower limb FMS test. At the same time, due to the differences of individual athletes, the existing rehabilitation training can not comprehensively improve the scores of all aspects, and there are still some shortcomings in the recovery process. Therefore, it is necessary to customize the rehabilitation training program according to the athletes' own conditions, so as to improve the FMS scores in all aspects and promote the recovery of athletes' lower limb injuries.

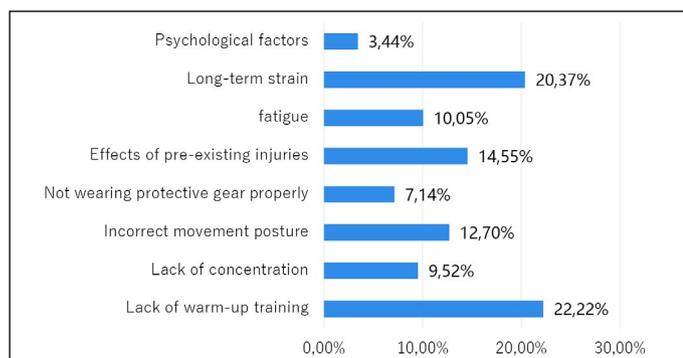


Figure 2. Causes of lower limb sports injury.

Table 1. Effect of rehabilitation training management on Athletes' lower limb FMS test results.

Action	Before	After	P
Squat	1.8474±0.4206	2.2515±0.5109	0.0010
Cross -column	Left 1.4988±0.7386	2.6332±0.2539	0.0010
	Right 1.4837±0.7190	2.4523±0.4225	0.0010
Squatting on the front and rear	Left 1.8276±0.3678	2.7506±0.2127	0.0010
	Right 1.6973±0.4673	2.4887±0.3260	0.0010
Raise straight legs	Left 1.9751±0.0000	2.2382±0.0000	0.0356
	Right 1.9258±0.3646	2.1541±0.9196	0.4289
Body rotation	Left 1.8873±0.4520	2.0375±0.2864	0.3449
	Right 1.8760±0.5539	2.1764±0.4774	0.0275
Stable push -ups of trunk	1.2804±0.7075	2.0255±0.5692	0.0010

As shown in Table 2, through effective rehabilitation training, the number of front and both sides passing increased from 5 (25.00%) before training to 11 (55.00%) after training; The number of posteromedial bilateral walkers increased from 6 (30.00%) before training to 14 (70.00%) after training ($P > 0.05$), indicating that although the number of rehabilitated people increased, there was no significant difference. The number of posterolateral bilateral passers-by increased from 7 (35.00%) before training to 12 (60.00%) after training; The number of comprehensive passing on the left side increased from 4 (20.00%) before training to 15 (75.00%) after training; The number of comprehensive passing on the right side increased from 7 (35.00%) before training to 15 (75.00%) after training ($P < 0.05$), indicating that there was a significant difference.

DISCUSSION

In view of the athletes' high-intensity training content and close training plan, how to reduce the probability of lower limb sports injury is the focus of our research. Before training, adequate preparations should be made to effectively prevent the occurrence of lower limb sports injury. The prevention of avoiding training injury can be carried out from several aspects: I Warm up and stretching activities are carried out before training. By stretching the lower limbs, the muscles can quickly enter the movement state and improve the muscle movement activity. In response to emergency stress, muscles can share part of the pressure. It can effectively reduce the damage caused by excessive force on the joints and soft tissues of lower limbs under the action of strength. It also effectively avoids the occurrence of lower limb muscle strain, lower limb muscle tear, ligament rupture, etc. Adequate warm-up activities can enable athletes to carry out training activities in a safe physical state. II The coach guides the athletes to take standard training actions to avoid sports injury caused by the stress problem of lower limb muscle tissue caused by non-standard training actions. The coach arranges reasonable training tasks, or arranges the training content within his own ability. Refuse blind training, do not conform to the actual training content, and carry out targeted training in combination with their own abilities. III Daily focus on lower limb strength training. Good muscle strength of lower limbs can share the excessive stress of lower limbs, effectively reduce sports injury during training, and protect lower limbs through their own muscles. IV Athletes need to cultivate self-protection awareness and learn relevant safety knowledge to deal with different emergencies. Theoretical knowledge can be actively applied in training to avoid training accidents. The application of some theories can reduce the harm caused by sports and the degree of injury. V Select appropriate sports protective equipment. Choosing the right sports protective device can effectively avoid the injury caused by sports, such as most skin injuries, and some protective devices can protect joints and soft tissues, and avoid serious situations such as ligament tear and Achilles tendon rupture.

In the face of sports injuries, how to effectively carry out recovery activities to maximize the recovery efficiency of injuries, we need to carry out rehabilitation management through the following aspects: I. Avoid exerting force on the injured part and seek the guidance of medical staff in time. II. Refuse to judge the degree of recovery by yourself and

Table 2. Effect of rehabilitation training management on Athletes' passing results of y-balance test.

Project	Before		After		P
	No.	Proportion	No.	Proportion	
Front bilateral	5	25.00%	11	55.00%	0.054
Rear bilateral side	6	30.00%	14	70.00%	0.063
Rear and outer side	7	35.00%	12	60.00%	0.000
On the left	4	20.00%	15	75.00%	0.001
On the right	7	35.00%	15	75.00%	0.001

recover under the guidance of doctors to avoid secondary injury or habitual injury. III. The injured part should be treated with cold and hot compress in time to relieve the fatigue of muscle tissue and help the recovery of the injured part. IV. Avoid sports during recovery. If you want to do sports, you should do it under the guidance of a doctor, who will judge the recovery. V. Develop reasonable work and rest habits, which is conducive to the recovery of injuries. Pay attention to diet and avoid unhealthy eating habits affecting the recovery of injured parts. VI. Timely giving doctors information on rehabilitation and communicating with doctors can enable doctors to formulate recovery plans and opinions for the injured and wounded in a timely manner.

CONCLUSION

It can be seen from the research in this paper that the current lower limb injury is a common type of sports injury in physical training. The lack of necessary warm-up training, inattention and excessive fatigue in the process of sports will cause lower limb injury. However, relatively speaking, lower limb injuries mainly include strain, contusion and ligament injury.

Although it will bring discomfort for a period of time, better recovery effect can be achieved through effective rehabilitation training. Through the combination of physical training and medical rehabilitation, the rehabilitation management of athletes with lower limb injury can effectively improve the flexibility of athletes' lower limb joints, restore athletes' lower limb sports ability, and prolong their sports life. Therefore, it is worth popularizing. Coaches should actively communicate with doctors and customize a reasonable rehabilitation plan according to the athletes' own conditions. Athletes should pay attention to the prevention of lower limb sports injury in the process of sports training, carefully complete the warm-up action, and maintain a good attitude and serious attitude in the process of sports, step by step. In case of sports injury of lower limbs, we should carefully follow the doctor's advice and the coach's arrangement, and scientifically complete the rehabilitation training, so as to recover our physical function as soon as possible and return to the game.

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