

REHABILITATION OF KNEE INJURIES IN BASKETBALL PLAYERS



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REABILITAÇÃO DE LESÕES DO JOELHO EM JOGADORES DE BASQUETEBOL

REHABILITACIÓN DE LESIONES DE RODILLA EN JUGADORES DE BALONCESTO

Bin He¹ 
(Physical Education Professional)

1. Jiangsu Huaiyin Normal University, School of Physical Education, Huai'an, Jiangsu, China.

Correspondence:

Bin He
Huai'an, Jiangsu, China. 223300.
hb@hytc.edu.cn

ABSTRACT

Introduction: Basketball games are extremely combative, and the knee joint is severely impacted between runs and jumps inherent to the sport, and its injury is often inevitable. **Objective:** Investigate the rehabilitation processes for knee joint injuries in basketball players. **Methods:** In this paper, six athletes were questioned about the rehabilitation approach used for their injuries. In all, the centrifugal training system was used. The frequency of the exercises was three times a week, with one-day intervals. The overall training lasted nine weeks. Before and after the experiment, the athletes' knee joint mobility and pain scores were measured, and the data were compared and analyzed. **Results:** After nine weeks of training, the pain score by the visual analog scale was 2-4 points, corresponding to the score of mild pain without expressive impacts on activities of daily living. **Conclusion:** The form of lower limb centrifugal training proposed in this study may help the recovery of functional status in the athletes' knee joint, improve their joint mobility and reduce pain, presenting itself as an effective training method to be incorporated into rehabilitation. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Knee Joint; Injuries, Sports; Exercise Therapy.

RESUMO

Introdução: Os jogos de basquetebol são extremamente combativos e a articulação do joelho é impactada severamente entre as corridas e pulos inerentes ao esporte, sendo a sua lesão muitas vezes inevitável. **Objetivo:** Investigar os processos de reabilitação em lesões da articulação do joelho nos jogadores de basquete. **Métodos:** Neste trabalho, 6 atletas foram questionados sobre a abordagem de reabilitação utilizada para as suas lesões. Em todos, o sistema de treinamento centrífugo foi utilizado. A frequência dos exercícios foi de três vezes semanais, com intervalos de um dia. O treinamento geral durou 9 semanas. Antes e depois do experimento, foram aferidas a mobilidade articular do joelho e os índices de dor dos atletas, e os dados foram comparados e analisados. **Resultados:** Após 9 semanas de treinamento, a pontuação de dor pela escala visual analógica foi de 2-4 pontos, correspondendo à pontuação de dor leve, sem impactos expressivos nas atividades de vida diária. **Conclusão:** A forma de treinamento centrífugo de membros inferiores proposta neste trabalho pode auxiliar na recuperação do estado funcional na articulação do joelho dos atletas, melhorar a sua mobilidade articular e reduzir a dor, apresentando-se como um método eficaz de treinamento para ser incorporado à reabilitação. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Articulação do Joelho; Lesões Esportivas; Terapia por Exercício.

RESUMEN

Introducción: Los partidos de baloncesto son extremadamente combativos y la articulación de la rodilla sufre un fuerte impacto entre las carreras y los saltos inherentes al deporte, siendo su lesión muchas veces inevitable. **Objetivo:** Investigar los procesos de rehabilitación en las lesiones de la articulación de la rodilla en jugadores de baloncesto. **Métodos:** En este trabajo, se interrogó a 6 atletas sobre el enfoque de rehabilitación utilizado para sus lesiones. En todos ellos se utilizó el sistema de entrenamiento centrífugo. La frecuencia de los ejercicios era de tres veces por semana, con intervalos de un día. La formación general duró 9 semanas. Antes y después del experimento, se midieron las puntuaciones de movilidad y dolor de la articulación de la rodilla de los atletas, y se compararon y analizaron los datos. **Resultados:** Tras 9 semanas de entrenamiento, la puntuación del dolor según la escala visual analógica era de 2-4 puntos, lo que corresponde a la puntuación de dolor leve, sin impactos expresivos en las actividades de la vida diaria. **Conclusión:** La forma de entrenamiento centrífugo de miembros inferiores propuesta en este estudio puede ayudar a recuperar el estado funcional en la articulación de la rodilla de los deportistas, mejorar su movilidad articular y reducir el dolor, presentándose como un método de entrenamiento eficaz para ser incorporado en la rehabilitación. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Articulación de la Rodilla; Lesiones en Atletas; Terapia por Ejercicio.



INTRODUCTION

Basketball is a sports event that involves the whole body and combines aerobic and anaerobic. The popularity of the project is very high, so the participation is also very considerable. In modern competitive sports, basketball is developing in the direction of high, fast and accurate.¹ The training system and theoretical knowledge are constantly updated. Although there is still a certain gap between China's system and theory and the rest of the world. However, due to China's population, there are a large number of people participating in basketball. And new fans join every year. Therefore, the lack of all kinds of theoretical knowledge leads to the existence of hidden dangers in the process of basketball. Basketball requires the comprehensive physical quality of the athletes to reach a certain foundation, so that the project can be carried out easily.² Among the numerous basketball technical movements, the combination of running and jumping occupies a major part. Moreover, the ability of running and jumping can also preliminarily judge the upper limit of basketball ability of athletes.³ Due to long-term exercise, muscles and joints in the legs are easily in fatigue or exercise overload state. Many athletes in order to achieve the goal of improving basketball skills. In daily training, targeted strength training will be conducted for each part of the leg.⁴ Because the theoretical knowledge of training is not mature, it is possible to carry out blind training, resulting in the training results being counterproductive. Therefore, in daily training and competition, leg injury is the main safety hazard of the project. Among them, the knee joint sports injury is the most representative. The severity of knee joint injury depends on the cause of knee joint movement injury.⁵ Therefore, in-depth study of the causes of knee joint sports injury is of great help to the athletes with knee joint sports injury. Review the clinical and experimental research of knee joint rehabilitation to provide data support for the rehabilitation treatment of injured and injured groups.⁶ Therefore, this paper starts from two aspects. On the one hand, it investigates the severity of knee joint injury and the causes of injury, so as to summarize the situation of knee joint injury; On the other hand, it puts forward effective rehabilitation training and analyzes its sports effect, so as to provide some ideas for the adjustment of athletes' knee joint injury.⁷

METHOD

Firstly, this paper uses the literature research method to consult the literature related to the knee joint injury of basketball players, and makes a comprehensive analysis from the aspects of medicine, kinematics, physiology and so on, so as to make a certain interview basis. Then, the interview method was used to interview 6 athletes with knee joint sports injury. The study and all the participants were reviewed and approved by Ethics Committee of Jiangsu Huaiyin Normal University (NO. JHNU2019-07AQ). The content of the interview includes the specific situation of their knee joint injury, the time of injury, the cause of injury, and the psychological feeling when they were injured, so as to have a basic understanding of the current athletes' knee joint injury and its treatment. The specific situation of the six research subjects is shown in Table 1.

Table 1. Basic information of six subjects.

Number	Age	Height	Weight
1	21	187.3	75.67
2	21	185.9	74.52
3	22	187.6	78.53
4	21	188.2	77.84
5	21	181.4	72.46
6	21	183.3	79.64

Centrifugal training of lower limbs for athletes with knee joint injuries can effectively enhance the muscle strength of lower limbs, enhance their balance and stability, and enhance their resistance to resistance. Therefore, centrifugal training also plays a certain role in sports rehabilitation. In order to make the effect more clear and avoid delaying the treatment of athletes in the control experiment, this paper chose the method of comparison before and after the group, and adopted centrifugal training for 6 athletes. The centrifugal training system was used. The exercise frequency was three times a week with an interval of one day. The overall training lasted for 9 weeks. In the course of 9 weeks, apart from the uniform centrifugal training, the athletes did not carry out any other forms of rehabilitation training, and the rest and diet of the six athletes were almost the same, so as to minimize the interference of unrelated variables on the experimental results.

Data acquisition mainly includes two aspects, one is the mobility of the knee joint, and the other is the score of VAS pain detection changes. The knee joint mobility test is conducted with the lower limb balance tester. During the test, the athlete stands on the equipment with one foot, and the other foot shifts the small wooden block to the specified direction as far as possible. The range of knee joint mobility can be determined by measuring the moving distance of the small wooden block. This method can enlarge the measurement effect to a certain extent, make the change clearer and more convenient for research. In order to evaluate the knee joint mobility of athletes in an all-round way, the left foot and the right foot are selected. Each aspect moves in four directions: left upper, right upper, right rear and left rear, so as to obtain more comprehensive data. Before and after the experiment, the knee joint mobility of the athletes was measured, and the data were analyzed.

For athletes, the rehabilitation of their knee joint injuries includes not only the optimization of the degree of activity, but also the reduction of pain. Therefore, the VAS pain detection method was selected. In the third week, the sixth week and the ninth week after the sports training, the athletes score the pain degree respectively, so as to periodically analyze the effect of pain relief.

RESULTS

Investigation on knee joint injury of basketball player

As shown in Table 2, 6 athletes were analyzed for sports injuries and the causes of injuries.

Effect of rehabilitation training on knee joint mobility

Table 3 shows the knee joint mobility when the left foot is standing, and table 4 shows the knee joint mobility when the right foot is standing.

Table 2. Knee joint injury of basketball players and its causes.

Number	How to damage	Specific injury site
1	Sprained layup	lateral collateral ligament injury
2	Scrambling for rebounds	lateral collateral ligament injury
3	Chronic strain	Popliteal pain
4	Fight for offensive rebounds	Anterior cross tear
5	Chronic strain	Chondromalacia patella
6	Basket confrontation	Meniscus damage

Table 3. Knee joint mobility of athletes with left foot standing.

Direction	Before training	After training
Upper left (cm)	64.14±3.158	70.84±2.763
Upper right (cm)	106.44±2.856	112.19±2.487
Right rear (cm)	94.50±3.339	110.30±3.162
Left rear (cm)	78.94±2.089	97.91±2.467

It can be seen from Table 3 that when the left foot is standing, the offset of the athlete's knee joint from the upper left side is from (64.14 ± 3.158) cm to (70.84 ± 2.763) cm, the offset from the upper right side is from (106.44 ± 2.856) cm to (112.19 ± 2.487) cm, the offset from the right rear side is from (94.50 ± 3.339) cm to (110.30 ± 3.162) cm, and the offset from the left rear side is from (78.94 ± 2.089) cm to (97.91 ± 2.467) cm. This shows that after 9 weeks of lower limb centrifugal training, the range of motion of the left knee joint of the athletes is greatly increased, and the flexibility and range of motion of the knee joint are also increased.

It can be seen from Table 4 that when the right foot is standing, the offset of the athlete's knee joint to the upper left is from (103.61 ± 2.368) cm to (113.34 ± 2.862) cm, the offset to the upper right is from (94.50 ± 2.244) cm to (101.99 ± 2.586) cm, the offset to the rear right is from (69.63 ± 2.732) cm to (80.96 ± 3.060) cm, and the offset to the rear left is from (88.81 ± 3.084) cm to (116.27 ± 2.664) cm, which have been significantly improved. It can be seen that 9 weeks of lower limb centrifugal rehabilitation training can effectively improve the activity of the athletes' right knee joint.

Effect of rehabilitation training on knee joint pain

As mentioned above, when an athlete's knee joint is injured, if he flexes or stretches in a certain direction or the range of flexion and extension is too large, the injured part will be affected, causing unbearable pain, thus preventing the athlete from continuing to exercise. Therefore, if we want to judge the effect of rehabilitation training, we should start from the degree of pain. In the course of the experiment, four time nodes were selected, with an interval of three weeks. The knee joint flexion and extension training with uniform intensity was carried out. With the help of VAS pain detection scale, the athletes scored their knee joint pain and drew pictures to explore the changes of pain during the exercise. The specific picture is shown in Figure 1.

It can be seen from Figure 1 that at the beginning, that is, the week 0, the pain scores of the six athletes were between 5 and 6. Through the analysis above, we can see that 4-6 points belong to the scores that affect concentration, but will not have too much impact on daily life. It shows that the athletes can not carry out normal sports training at this time, but it will not have too much impact on their self-care ability in daily life. It can be seen from the changes in the three time periods as a whole that during the 9-week training period of lower limb centrifugal exercise, the pain degree of the athletes is gradually reduced. It may be due to the different adaptation conditions of the athletes or the difference in the state during the exercise, the rate of pain reduction in the whole process changes slightly.

DISCUSSION

In daily sports, in the basketball event, the probability of suffering from knee joint injury can reach more than half among the groups that reach a certain length of time every day. Knee joint injury has brought a test to many athletes and enthusiasts. In the rehabilitation period, the patients with secondary knee joint injury are also more common. Knee joint injury can be divided into chronic injury and acute injury according to types. The number of acute injury is less than that of chronic injury, but the degree of acute injury is more serious. Most serious knee joint injuries are caused by sudden violent impact or sudden sprain. When basketball is in progress, rapid disguise or sudden stop jump shot is the direct cause of acute injury of most knee joints. Secondly, the athlete's feet landed improperly when shooting. The tissues of the knee joint are subjected to great external force, which results in knee joint injury. There are many objective reasons for knee joint injury. First of all, the lack of warm-up links and insufficient preparation

Table 4. Knee joint mobility of athletes with right foot standing.

Direction	Before training	After training
Upper left (cm)	103.61±2.368	113.34±2.862
Upper right (cm)	94.50±2.244	101.99±2.586
Right rear (cm)	69.63±2.732	80.96±3.060
Left rear (cm)	88.81±3.084	116.27±2.664

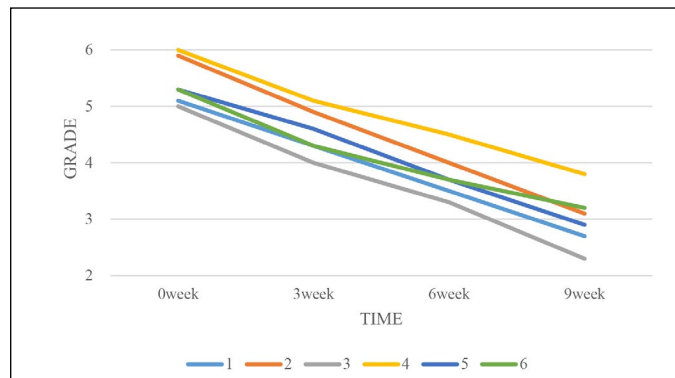


Figure 1. Changes in VAS pain detection.

activities led to the knee joint not meeting the sports requirements. Sufficient warm-up activities before exercise can effectively reduce the hidden danger of knee joint movement. When the warm-up exercise is guaranteed, the severity of sports injury can be effectively reduced even if it is suffered from sports injury. Secondly, the exercise duration is too long or the exercise frequency is too high. It is also an indirect cause of sports injury. After completing a sports event, the tissues and muscles of all parts of the body are in a state of fatigue. If you continue to exercise in the fatigue state, the body will be in an overload state, and the knee joint bears all its own gravity above the knee. In the fatigue state, the probability of knee joint sports injury is increased. Next is the lack of self-protection awareness of athletes. Since many basketball fans are students, the student group is not professional basketball players, and the self-protection awareness is weak. It is difficult to form the habit of wearing sports protective equipment. There is also a lack of theoretical knowledge as support, and it is difficult to deal with sudden injuries in emergency situations, missing the best treatment time for injuries. Even, it will lead to further deterioration of the injury. Finally, because the special physical quality of the athletes has not been fully trained, all the technical movements of basketball are based on their own physical quality, and their own muscle tissue cannot meet the sports requirements, so it is inevitable that knee joint sports injury will occur.

CONCLUSION

Because of the characteristics of basketball, the knee joint injury of athletes is an inevitable problem. Many excellent athletes bid farewell to the field because of the knee joint injury. Therefore, how to carry out rehabilitation training for the knee joint injury of athletes so that they can return to the field is a problem that many medical students and sports experts are studying. The form of lower limb centrifugal training proposed in this paper can adjust the knee joint state of athletes, improve their joint mobility and reduce pain. Therefore, it is an effective rehabilitation training method. In the actual training process, we should put forward a one-to-one rehabilitation training program according to the actual situation of the athletes, so as to improve the physical conditions of the athletes and help them return to the stadium.

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

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