

REHABILITATION OF KNEE INJURY BY CHINESE BOXING

REABILITAÇÃO EM LESÃO DE JOELHO PELO BOXE CHINÊS

REHABILITACIÓN DE LESIÓN DE RODILLA MEDIANTE EL BOXEO CHINO



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Zhiqian Tian¹
(Physical Education Professional)
Feng Dong¹
(Physical Education Professional)
Dongbin Li¹
(Physical Education Professional)
Chenfeng Liu²
(Physical Education Professional)

1. Xi'an University of Technology,
Physical Education Department,
Xi'an, Shaanxi, China.
2. Xi'an Physical Education
University, Graduate Division, Xi'an,
Shaanxi, China.

Correspondence:

Feng Dong
Xi'an, Shaanxi, China. 710048.
dongfeng735@163.com

ABSTRACT

Introduction: Chinese boxing is a highly combative sport and injuries are inevitable. Rehabilitation of knee joint injuries can not only save the athlete's professional career but also improve their prevention ability. **Objective:** Study the situation of knee joint injuries in Chinese boxing and explore the strategies of sports rehabilitation. **Methods:** This experiment lasted 8 weeks. The knee joint activity and daily exercise ability of the control and experimental groups were tested. **Results:** In the experimental group, the knee joint extension range was increased to $-1.61^\circ (\pm 2.228)$, the knee joint flexion range was increased to $97.14^\circ (\pm 6.430)$, the walking ability score was increased to $32.25 (\pm 5.751)$ points, and the stair climbing and descending ability score was increased to $35.12 (\pm 8.764)$ points. The control group's scores were also optimized, but the range of optimization was smaller than that of the experimental group. **Conclusion:** Compared with traditional physical therapy and massage, sports rehabilitation training has a more significant effect on improving the range of motion and prevention ability on athletes' knee joints and should be promoted. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Boxing; Injuries, Sports; Knee Joint.

RESUMO

Introdução: O boxe chinês é um esporte altamente combativo e suas lesões são inevitáveis. A reabilitação de lesões nas articulações do joelho pode não apenas salvar a carreira profissional do atleta como também melhorar a sua capacidade de prevenção. **Objetivo:** Estudar a situação das lesões nas articulações do joelho pelo boxe chinês e explorar as estratégias de reabilitação esportiva. **Métodos:** Esta experiência teve duração de 8 semanas. A atividade articular do joelho e a capacidade de exercício diário dos grupos controle e experimental foram testadas. **Resultados:** No grupo experimental, o alcance da extensão da articulação do joelho foi aumentado para $-1,61^\circ (\pm 2,228)$, o alcance da flexão da articulação do joelho foi aumentado para $97,14^\circ (\pm 6,430)$, a pontuação da capacidade de caminhar foi aumentada para $32,25 (\pm 5,751)$ pontos, e a pontuação da capacidade de subir e descer escadas foi aumentada para $35,12 (\pm 8,764)$ pontos. Os índices do grupo de controle também foram otimizados, mas a faixa de otimização foi menor do que a do grupo experimental. **Conclusão:** Em comparação com a fisioterapia e massagem tradicionais, o treinamento de reabilitação esportiva tem um efeito mais significativo na melhoria da amplitude de movimento e na capacidade de prevenção sobre as articulações dos joelhos dos atletas, devendo ser promovido. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Boxe; Lesões Esportivas; Articulação do Joelho.

RESUMEN

Introducción: El boxeo chino es un deporte altamente combativo y sus lesiones son inevitables. La rehabilitación de las lesiones de la articulación de la rodilla no sólo puede salvar la carrera profesional del deportista, sino también mejorar su capacidad de prevención. **Objetivo:** Estudiar la situación de las lesiones de la articulación de la rodilla por el boxeo chino y explorar las estrategias de rehabilitación deportiva. **Métodos:** Este experimento duró 8 semanas. Se comprobó la actividad de la articulación de la rodilla y la capacidad de ejercicio diario de los grupos de control y experimental. **Resultados:** En el grupo experimental, el rango de extensión de la articulación de la rodilla aumentó a $-1,61^\circ (\pm 2,228)$, el rango de flexión de la articulación de la rodilla aumentó a $97,14^\circ (\pm 6,430)$, la puntuación de la capacidad de caminar aumentó a $32,25 (\pm 5,751)$ puntos, y la puntuación de la capacidad de subir y bajar escaleras aumentó a $35,12 (\pm 8,764)$ puntos. Las puntuaciones del grupo de control también se optimizaron, pero el rango de optimización fue menor que el del grupo experimental. **Conclusión:** En comparación con la fisioterapia tradicional y el masaje, el entrenamiento de rehabilitación deportiva tiene un efecto más significativo en la mejora de la amplitud de movimiento y la capacidad de prevención en las articulaciones de la rodilla de los atletas y debería promoverse. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Boxeo; Lesiones en Deportes; Articulación de la Rodilla.



INTRODUCTION

In the process of Wushu Sanda, the whole body and limbs participate in the project, and the combination of anaerobic and aerobic support the project. Wushu Sanda evolved from traditional Wushu. With the development of modern sports, it has gradually developed into a characteristic Wushu sport. Wushu Sanda is developing faster and stronger.¹ The training system and project theory are constantly being explored and updated. Now, it has been well used in training and actual combat. China's traditional martial arts and martial arts culture have a long history.² The project has been constantly updated in the historical inheritance, and the project development has been quite mature. The project participation also has a certain scale. However, professional personnel are very scarce, and there is a lack of training under the guidance of professional personnel, which leads to great potential safety hazards when carrying out project related sports.³ Although Wushu Sanda has a strong inclusiveness, the difficulty can be adjusted according to the actual situation. However, athletes prefer to have high-quality sports experience, which will inevitably increase the training intensity. Eventually lead to various sports injuries. Therefore, Wushu Sanda events need to have a certain physical quality as the basis of competition. In many Wushu Sanda technical movements, jumping, kicking and other movements combined with knee joint participation account for the main part. Moreover, athletes who are good at leg use have a higher utilization rate.⁴ Due to the use of leg technical movements for a long time, muscles, tissues and joints in the legs are prone to fatigue and even exercise overload. Some athletes, in order to improve leg strength. In the daily training link, targeted training will be carried out for the legs.⁵ Because the theoretical knowledge of training is not mature, it is easy to train blindly, and the training results are inefficient, which increases the loss of the knee joint. Knee joint injury is the most representative of leg injury. The degree of knee injury depends on the cause of injury. Therefore, it is a major problem in the development of the project to study the problem of knee joint injury and sports rehabilitation after injury. Coaches' in-depth study can provide effective guidance for athletes.⁶

METHOD

In order to understand the knee joint injury in Wushu Sanda, the article first investigated 69 Wushu Sanda students and athletes with knee joint injury by questionnaire, and summarized and analyzed the technical movements and the causes of knee joint injury. Subsequently, 20 athletes with knee joint injuries were selected as the research objects and divided into experimental group and control group. The study and all the participants were reviewed and approved by Ethics Committee of Xi'an University of Technology (NO.2019XAUT08-CT).

According to the knee joint damage of the two groups of athletes, the routine massage and rehabilitation exercise were selected. The control group used the conventional massage rehabilitation method, and the special masseuse performed massage physiotherapy three times a week, and the length of each massage physiotherapy was one hour. At the same time that the control group received massage and physical therapy, the experimental group received rehabilitation training. The purpose was to relax the muscles around the knee joint, strengthen their strength indicators, improve the stability and balance of the knee joint, and alleviate the damage of the athlete's knee joint through soft tissue relaxation training and stability training of the knee joint, as well as muscle strength training of the knee joint.

This experiment lasted for a total of 8 weeks. Except for the different rehabilitation methods, the experimental group and the control group were basically the same in all aspects, and there was no other situation that would cause knee injury in the experimental group and the control

group during the whole experiment. Before and after the beginning of the experiment, the knee joint activity and daily exercise ability were tested, and the indicators were taken as the research data to compare and analyze the impact of relevant rehabilitation training on the knee joint rehabilitation of athletes.

RESULTS

Knee joint injury of Wushu Sanda Athletes

It can be seen from Figure 1 that the technical actions of current Wushu Sanda athletes with knee joint injury mainly include kicking, punching, holding and falling and knee top. Among them, the technical action with the highest knee joint injury is kicking, with 32 people, accounting for 46.38%; The second was holding and throwing, with 25 people, accounting for 36.23%; The third is the knee top, with 9 people, accounting for 13.04%; The last is the auxiliary injury of knee joint in boxing, only 3 people, accounting for 4.35%.

In addition to the technical actions when injuries occur, this paper also analyzes the causes of injuries to athletes. When answering this question, there are three main reasons: first, the warm-up preparation activities are not enough. Many athletes feel that they have mastered the basic essentials of Sanda, so they often pay too much attention to the training content when training, and the warm-up preparation activities before training are not enough. At this time, it is very easy to cause knee joint injury if they carry out some large-scale activities. The second is that they were not focused enough at that time. Some athletes were thinking about other things in their hearts when they were training. They only mechanically completed the training of related movements, which made them not concentrate enough in the training process. Many movements did not do a good job of self-protection during the training, resulting in sports injuries. The third is overload sports. In order to achieve better training results in a relatively short time, many athletes often choose the form of overload sports. For example, they try to improve their sports level through long-term sports training, but it leads to knee strain; It also includes athletes' rash practice of higher level skills before they have the relevant skills, resulting in injury.

It can be seen from this that for Wushu Sanda athletes, they should do a good job in the process of sports, such as warm-up and stretching activities before training, pay attention to improving their concentration during sports, and carefully do every move. They can't take it lightly. Finally, we should pay attention to scientific arrangement of exercise load, optimize our own training content with the help of coaches, so as to achieve scientific level improvement.

Analysis of rehabilitation training on knee joint recovery

Table 1 shows the effect of rehabilitation training on the knee joint activity of the experimental group. It can be seen from the table that the extension range of the knee joint before the experiment is $(-3.83 \pm 3.304)^\circ$, after the experiment it is increased to $(-1.61 \pm 2.228)^\circ$, the

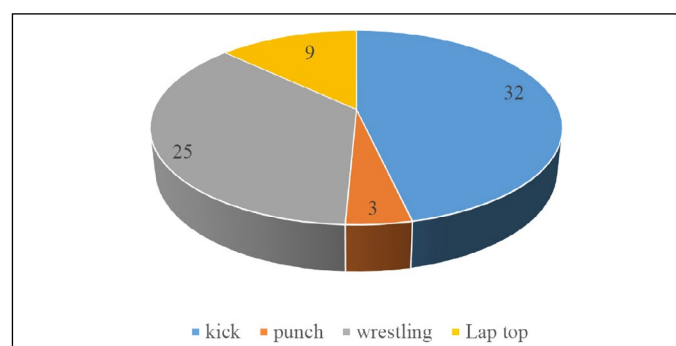


Figure 1. Injury of knee joint in Sanda.

flexion range of the knee joint before the experiment is $(75.14 \pm 5.311)^\circ$, and after the experiment it is increased to $(97.14 \pm 6.430)^\circ$, which indicates that rehabilitation training can effectively improve the range of motion of the knee joint and reduce the pain during large-scale exercise.

As shown in Table 2, the effect of massage physiotherapy on the knee joint activity of the control group is shown. Before the experiment, the knee joint extension range was $(-3.11 \pm 2.508)^\circ$, after the experiment, it increased to $(-2.83 \pm 1.489)^\circ$, before the experiment, the knee joint flexion range was $(73.47 \pm 4.822)^\circ$, and after the experiment, it increased to $(83.97 \pm 3.703)^\circ$. It can be seen that traditional massage physiotherapy can also improve the range of motion of the injured knee joint of athletes.

Table 3 shows the effect of rehabilitation training on the knee rehabilitation of the experimental group. It can be seen from the table that the walking ability score before the experiment was (20.75 ± 3.006) points, which increased to (32.25 ± 5.751) points after the experiment, the ability score before the experiment to ascend and descend stairs was (18.70 ± 6.840) points, and increased to (35.12 ± 8.764) points after the experiment. Therefore, the sports rehabilitation training proposed in this paper can improve the walking ability and the ability to ascend and descend stairs of athletes, which also means that the self-care ability of athletes has been improved, it shows that rehabilitation training is helpful to the knee joint recovery of the athletes in the experimental group.

Table 4 shows the effect of massage physiotherapy on the knee rehabilitation of the control group. It can be seen from the table that the walking ability score before the experiment was (19.43 ± 4.627) points, which increased to (26.51 ± 1.887) points after the experiment, the ability score before the experiment to ascend and descend stairs was (17.84 ± 5.661) points, and increased to (24.01 ± 6.401) points after the experiment. It can be seen from the table that traditional massage physiotherapy can promote the recovery of athletes' relevant abilities.

Through the analysis of the data, it can be seen that before the rehabilitation training, the knee joint scores of the experimental group and the control group belong to those who can go up the stairs with the help of handrails, but cannot complete the action of going down the stairs independently. In terms of sports, you can walk continuously

outdoors, but the walking distance is less than 1km, which indicates that you are in a relatively serious injury situation. It can be seen from the sports training that the experimental group can complete the activities of going up and down stairs with the help of handrails, and has basic self-care ability. In terms of sports walking, its continuous walking distance is more than 1km, between 1km and 2km. After the experiment, although the control group's flexibility to climb the stairs increased, it still could not independently complete the activities to climb down the stairs. In terms of walking distance, although it also reached the ability to walk 1-2 kilometers, its walking distance was lower than that of the experimental group. This shows that the sports rehabilitation training method proposed in this paper is higher than the traditional physical therapy and massage training method in improving self-care ability.

DISCUSSION

Among Wushu Sanda athletes, there are not a few who suffer from knee joint injury. Knee joint injury can be divided into acute injury and chronic injury. Most of the acute injuries are caused by the sudden increase of the force on the knee joint, which leads to the overload of the knee joint and the injury of the knee joint. Secondly, the knee joint is subjected to external force, and some vulnerable tissues of the knee joint are subjected to force in the wrong direction, resulting in damage to the meniscus or ligament. A serious knee sprain occurred. Next, due to the lack of necessary warm-up exercise, the soft tissue of the knee joint did not meet the sports requirements, and the soft tissue toughness was not enough, resulting in various tear type injuries. The necessary warm-up exercise is conducive to entering the sports state quickly, and can effectively reduce the severity of injuries even in the event of accidents. In Wushu Sanda events, knee joint injury also occurs due to non-standard technical actions, which leads to knee deformation. The choice of venues is also an important factor affecting injuries. During the training process, the lack of professional training venues may greatly increase the risk of injury for athletes. Because there will be many combined jumping movements in the process of training and actual combat. Nonprofessional venues will cause athletes to land unsteadily or even fall to the ground. There are also individual injury cases, which are caused by unscientific training plans. The exercise time is too long and the exercise frequency is too high, resulting in the knee joint being in a state of fatigue and vulnerability for a long time. It is easy to cause sports injury if you exercise in this state. Even if there is no injury, there is a great risk of injury. Finally, it is because athletes lack self-protection consciousness. Fail to take self-protection actions in time when accidents occur. In the classification of chronic injuries, most are due to long-term sportswear and aging of joint tissues. Chronic injury is probably irreversible and difficult to repair. Therefore, athletes should check and maintain their joint tissues in time.

CONCLUSION

For Wushu Sanda athletes, promoting the recovery of their knee joint sports injury can not only save the career of athletes and prevent them from bidding farewell to the competition forever due to sports injury, but also enhance the daily self-care ability of athletes and prevent the lifelong impact of excessive injury on athletes. The results of this study show that compared with traditional physical therapy and massage, sports rehabilitation training has a more significant effect on improving the range of motion and self-care ability of athletes' knee joints, so it is worth promoting.

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

Table 1. Analysis of rehabilitation training on knee joint activity in the experimental group.

Option	Before	After	P
Stretch (°)	-3.83±3.304	-1.61±2.228	0.00543
Flexion (°)	75.14±5.311	97.14±6.430	0.00932

Table 2. Analysis of massage physiotherapy on knee joint activity of the control group.

Option	Before	After	P
Stretch (°)	-3.11±2.508	-2.83±1.489	0.00161
Flexion (°)	73.47±4.822	83.97±3.703	0.02176

Table 3. Analysis of rehabilitation training on knee joint rehabilitation in the experimental group.

Option	Before	After	P
Walking ability	20.75±3.006	32.25±5.751	0.00881
Down stairs	18.70±6.840	35.12±8.764	0.00346

Table 4. Analysis of knee joint rehabilitation of massage physiotherapy on the control group.

Option	Before	After	P
Walking ability	19.43±4.627	26.51±1.887	0.04025
Down stairs	17.84±5.661	24.01±6.401	0.03511

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