

# SCENARIO OF JOINT INJURY IN AEROBIC EXERCISE AND RECOVERY STRATEGIES



ORIGINAL ARTICLE  
ARTIGO ORIGINAL  
ARTÍCULO ORIGINAL

CENÁRIO DA LESÃO ARTICULAR EM EXERCÍCIOS AERÓBICOS E ESTRATÉGIAS DE RECUPERAÇÃO

ESCENARIO DE LA LESIÓN ARTICULAR EN EJERCICIOS AERÓBICOS Y ESTRATEGIAS DE RECUPERACIÓN

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## ABSTRACT

**Introduction:** Rehabilitation training and recovery strategies are very important for repairing joint injuries in aerobic exercise practitioners, requiring periodic updates on the state of the art for their trainers and rehabilitation professionals. **Objective:** Verify the current status of joint injuries in aerobic exercise practice and explore the means practiced for rehabilitation training. **Methods:** 90 aerobics athletes were selected as experimental subjects, and the experiment lasted 12 weeks. Injuries were recorded, and joint rehabilitation training was performed, according to the updated literature survey. **Results:** The total static resting parameters of the unaffected limbs of the experimental group showed changes from  $2.90 \pm 0.55$  to  $2.81 \pm 0.52$ , the anterior and posterior axial static parameters increased from  $2.03 \pm 0.71$  to  $2.14 \pm 0.73$ , the lateral axial static parameters showed no significant changes, following the parameters of the control group. The total static parameters at the rest of the injured limb in the experimental group showed changes from  $3.76 \pm 0.73$  to  $2.73 \pm 0.72$ , while the control group parameters showed no significant changes. **Conclusion:** The joint rehabilitation training for aerobics athletes currently practiced has shown to be satisfactory for the recovery of knee joint injuries in aerobic exercise practitioners. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Aerobic Exercise; Knee Injuries; Health Strategies; Athletes.

## RESUMO

**Introdução:** O treinamento de reabilitação e as estratégias de recuperação são muito importantes para o reparo de lesões nas articulações de praticantes de exercício aeróbico, necessitando de atualizações periódicas sobre o estado da arte para seus treinadores e profissionais de reabilitação. **Objetivo:** Verificar a situação atual das lesões articulares na prática de exercício aeróbico e explorar os meios praticados para o treinamento de reabilitação. **Métodos:** 90 atletas de aeróbica foram selecionados como sujeitos experimentais, e o experimento teve duração de 12 semanas. As lesões foram registradas, e o treinamento de reabilitação articular foi realizado, segundo o levantamento bibliográfico atualizado. **Resultados:** Os parâmetros estáticos totais de repouso dos membros não afetados do grupo experimental apresentaram alterações de  $2,90 \pm 0,55$  para  $2,81 \pm 0,52$ , os parâmetros estáticos axiais anteriores e posteriores elevaram-se de  $2,03 \pm 0,71$  para  $2,14 \pm 0,73$ , os parâmetros estáticos axiais laterais não apresentaram alterações significativas, acompanhando os parâmetros do grupo de controle. Os parâmetros estáticos totais de repouso do membro lesionado no grupo experimental apresentaram alterações de  $3,76 \pm 0,73$  para  $2,73 \pm 0,72$ , enquanto os parâmetros do grupo de controle não apresentaram alterações significativas. **Conclusão:** O treinamento de reabilitação articular para atletas de exercício aeróbico praticado atualmente mostrou-se satisfatório para a recuperação das lesões articulares de joelho nos praticantes. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Exercício Aeróbico; Traumatismos do Joelho; Estratégias de Saúde; Atletas.

## RESUMEN

**Introducción:** El entrenamiento de rehabilitación y las estrategias de recuperación son muy importantes para la reparación de lesiones en las articulaciones de los practicantes de ejercicio aeróbico, requiriendo actualizaciones periódicas sobre el estado del arte para sus entrenadores y profesionales de la rehabilitación. **Objetivo:** Verificar el estado actual de las lesiones articulares en la práctica del ejercicio aeróbico y explorar los medios practicados para el entrenamiento de rehabilitación. **Métodos:** Se seleccionaron 90 atletas de ejercicio aeróbico como sujetos experimentales, y el experimento duró 12 semanas. Se registraron las lesiones y se llevó a cabo el entrenamiento de rehabilitación articular, de acuerdo con el estudio bibliográfico actualizado. **Resultados:** Los parámetros estáticos totales en reposo de las extremidades no afectadas del grupo experimental mostraron cambios de  $2,90 \pm 0,55$  a  $2,81 \pm 0,52$ , los parámetros estáticos axiales anteriores y posteriores aumentaron de  $2,03 \pm 0,71$  a  $2,14 \pm 0,73$ , los parámetros estáticos axiales laterales no mostraron cambios significativos, siguiendo los parámetros del grupo control. Los parámetros estáticos totales en reposo del miembro lesionado en el grupo experimental presentaron cambios de  $3,76 \pm 0,73$  a  $2,73 \pm 0,72$ , mientras que los parámetros del grupo control no presentaron cambios significativos. **Conclusión:** El entrenamiento de rehabilitación articular para atletas de ejercicio aeróbico practicado actualmente demostró ser satisfactorio para la recuperación de lesiones articulares de rodilla en practicantes de ejercicio aeróbico. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptor:** Ejercicio Aeróbico; Traumatismos de la Rodilla; Estrategias de Salud; Atletas.



## INTRODUCTION

Among all sports, aerobics is gradually loved by athletes. With the popularity of the masses, aerobics can be practiced by bare-handed means with sufficient oxygen supply.<sup>1</sup> Aerobics is a kind of aerobic exercise, which mainly requires the body to provide system energy, so that aerobics athletes can continue to carry out a certain intensity of systemic exercise.<sup>2</sup> In order to improve the cardiorespiratory function of aerobics trainers to a certain extent, aerobic exercise is also needed, which can not only change the physical quality of the human body, but also achieve the endurance of muscles and the coordination function of various organs.<sup>3</sup> In addition, in the process of aerobics training, this aerobic exercise can not only bring athletes artistic sensory experience, but also enable trainers to enjoy the fun of sports. This sport is not only a beautiful sport, but also can make the athletes have a positive impact on the body proportion. At the same time, it can eliminate excess fat on the body, increase the lines of back muscles, and look more beautiful.<sup>4</sup>

The soft tissue around the joint will be damaged to different degrees. If the range of motion of the joint exceeds the normal index, then the joint will suffer from the phenomenon of bone joint damage under the action of external force, and the joint will suddenly move to one side, and often occurs at the ankle joint of the foot.<sup>5</sup> From a physiological point of view, this phenomenon is a conditioned reflex phenomenon. If it is impossible to control the skill way of the movement during the training, it is necessary to improve the uncompleted support movement according to the requirements.<sup>6</sup> When the beginner carries out the action support, if the action is not standardized and uncoordinated, errors will occur and the body will be damaged. This requires beginners to complete the training under the guidance of the teacher.<sup>7</sup> Aerobics can improve the flexibility and coordination of the athletes in the movement, because this sport combines the essence of various dances, such as the trunk head and neck movement in jazz dance, which can add a certain vitality effect to aerobics.<sup>8</sup> If the aerobics athletes have joint injuries during the training process, they need to stimulate the knee joints strongly to avoid meniscus injuries. In this study, the muscles before and after training need to be relaxed and rehabilitated, in order to further explore whether the relevant training strategies can be improved in regular training.<sup>9</sup>

## METHOD

### Research object

Joint injury is a very serious sports injury for athletes. In order to further explore the impact of joint rehabilitation training activities on joint injury, this paper selected 90 athletes of aerobics related majors for research and investigation before the beginning of the experiment. The study and all the participants were reviewed and approved by Ethics Committee of Chaohu University (NO.CHUS055T). The experimental period lasts for 12 weeks. These aerobics athletes have been trained for less than 2 years, and have not done any related joint rehabilitation training before the start of this experiment. The 90 experimental subjects were divided into two groups. The joint rehabilitation training activities were carried out on the uninjured joint and the injured joint of the members of the experimental group respectively, while the control group was not subject to any relevant joint rehabilitation training. During the 12 weeks of the experiment, all the subjects had normal aerobics exercise every day, and kept the same work, rest and diet as usual training.

### Experimental method

Before the beginning of the experiment, the physical indicators of 90 subjects were measured, and the measured data results met the standard requirements of the experiment, and the physical fitness of 90 subjects also met the core standard of the experiment. During the

experiment, the aerobics professional athletes in the experimental group were numbered, and joint rehabilitation training was carried out according to the number sequence. In this experiment, 90 experimental subjects were divided into two groups, namely the experimental group and the control group. The athletes in the experimental group received joint rehabilitation training on the uninjured side and the injured side of the joint respectively, while the control group did not receive any relevant joint rehabilitation training. During the experiment, the body parameters of 90 subjects were recorded, including total rest static parameters, front and rear axial static parameters and left and right axial static parameters. The data were analyzed and compared after the end of the 12-week experiment with the data before the beginning of the experiment to further explore the impact of joint rehabilitation training and improvement strategies on the joint injury of aerobics athletes.

### Test location

The 12-week training was always carried out in the aerobics training venue where the aerobics athletes usually conduct aerobics training. Before the experiment, the aerobics training venue was repaired and tested, and the infrastructure in the venue was repaired and updated to ensure the safety of the athletes during the normal aerobics exercise and joint rehabilitation training and avoid unnecessary sports injuries.

## RESULTS

### Joint injuries in aerobics

Through the use of professional equipment to detect the injury of 90 aerobics athletes, the specific sports injury is shown in Figure 1. Among the athletes selected in this test, 43 boys and 47 girls, 36 of 43 boys were injured to different degrees, 7 of them were not injured to related joints, 32 of 47 girls were injured to different degrees, and 15 of them were not injured to related joints. The injury rates of boys and girls during aerobics were 83.72% and 68.09% respectively. According to the comparative analysis of the sports injury data of boys and girls, it can be seen that the injury rate of boys is significantly higher than that of girls, which also shows that male aerobics athletes are more likely to cause joint injury in the process of aerobics. There are many reasons for the difference between boys and girls in this data, for example, boys are more active in the process of aerobics, and boys are more responsible for lifting activities, In addition, girls are more careful and careful in the process of sports, and boys are also more tolerant of injuries than girls. These reasons may lead to differences in the incidence of the two injuries. However, athletes of different genders have no influence on the reliability of the results of this experiment. The purpose of selecting

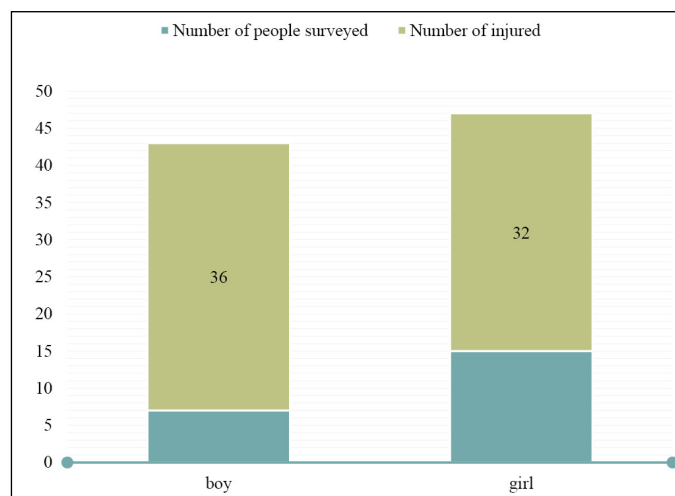


Figure 1. Sports injuries of athletes of different sexes.

athletes of different genders as experimental subjects is to enhance the universality and credibility of the experimental data.

After recording and analyzing the injuries of athletes' joints, the injuries of athletes' body parts were further tested, so that the data were recorded in detail, as shown in Figure 2. Among the athletes with joint injuries, their various parts of the body were injured to varying degrees. For example, six people suffered shoulder injuries, including two shoulder sprains, two shoulder strains, and two shoulder strains. However, there was no occurrence of shoulder bruises and shoulder fractures. Five people suffered elbow injuries of different degrees, including 2 people suffering from elbow strain, 2 people suffering from elbow abrasion, and 1 person suffering from elbow fracture. There were 8 people with wrist injuries, including 2 with wrist sprains, 2 with wrist strain, and 3 with wrist strain. 12 people suffered from different types of waist injuries, including 3 sprains, 1 strain and 8 strain. 24 people suffered knee injuries, including 3 knee sprains, 14 knee strains, 3 knee abrasions, and 4 knee fractures. In addition, 20 people suffered ankle injuries, including 11 ankle sprains, 5 ankle strains, 3 ankle strain, and 1 ankle fracture.

Through the comparative analysis of the data in Figure 2, it can be seen that there are more people suffering from knee joint injury, ankle joint injury and waist injury, while there are relatively few people suffering from shoulder, elbow and wrist injury. It can also be seen that in the process of aerobics, athletes' knee joint and ankle joint are more vulnerable to injury, and waist strain accounts for the majority of waist injury, while knee strain accounts for more people in knee joint injury, Among ankle injuries, ankle sprain is more common. Therefore, in the process of aerobics, we should pay more attention to the protection of these parts of athletes, and pay attention to the rehabilitation of waist, knee and ankle joints in the process of relevant joint rehabilitation training. In the improvement strategy, we also constantly remind athletes to pay more attention to their own protection in the training process, and increase the protection and improvement of relevant parts in the improvement strategy. At the same time, other three types of injured parts, such as shoulder, elbow and wrist, cannot be ignored to avoid greater injury.

### Improvement of joint injury in aerobics

Through a 9-week experiment on 90 professional aerobics athletes, the data changes and comparison of the non-injured side of the aerobics athletes are shown in Table 1. After joint rehabilitation training on the uninjured side of the athletes, the data changes of the experimental group and the control group were not very significant.

Through comparative analysis of various data, it can be seen that the effect of joint rehabilitation training on the repair of the non-injured side of aerobics professional athletes is not particularly significant, but

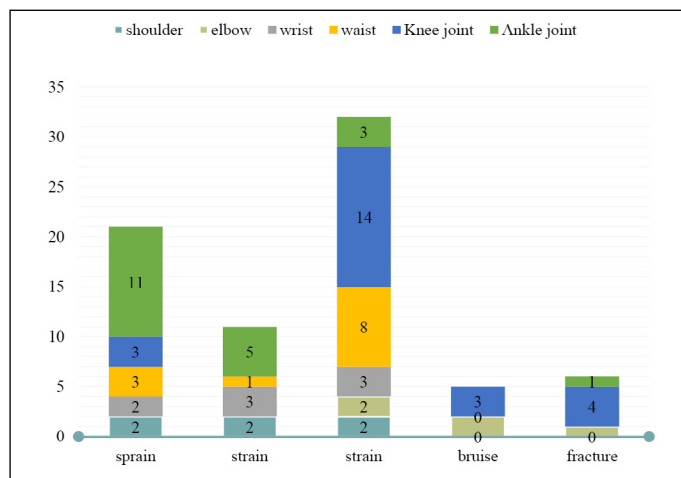


Figure 2. Damage at different parts.

it is also effective. For example, after joint rehabilitation training, the overall static parameters of aerobics athletes have decreased, while the front and rear axial static parameters and the left and right axial static parameters have increased. This also shows to some extent that joint rehabilitation training has a certain impact on the non-injured side of aerobics athletes, and has an improvement effect compared with the control group without joint rehabilitation training.

The experiment further conducted a 9-week experiment on 90 professional aerobics athletes. The data changes and comparison of the injured side of the aerobics athletes are shown in Table 2. After joint rehabilitation training on the injured side of the athletes, the data changes of the experimental group are very significant, while the data changes of the control group are not particularly significant compared with the experimental group.

By comparing the relevant data of the experimental group and the control group, it can be concluded that joint rehabilitation training has a greater impact on the injured side of the joints of aerobics athletes, which is significantly greater than that of the control group without any relevant joint rehabilitation training, and the data change trend is also significantly greater than that of the uninjured side of the joints of athletes, which can show that joint rehabilitation training has a significant improvement effect on the joint injury of athletes. Therefore, the joint rehabilitation improvement strategy can be further improved according to the various data of joint rehabilitation training, and regular joint rehabilitation training can be carried out after the athletes finish their daily training, so as to improve the joint injury of aerobics athletes.

### DISCUSSION

Aerobics is a very enjoyable sport. A group of people exercise with music in a very happy situation. Aerobics can adjust the healthy psychology of athletes and improve our mind and spirit. Aerobics is also a kind of warm-up exercise that requires a high degree of flexibility. Therefore, in order to avoid injury before exercise, athletes generally do a very adequate warm-up exercise to protect their bodies. If athletes are injured in the process of sports, they will recover as long as they are handled by special personnel. If athletes exercise for too long or too much, it will lead to overtraining, which is the main reason for sports injury. When athletes are overloaded during training and the

Table 1. Effect of joint rehabilitation training on the uninjured side of aerobics athletes with joint injuries.

| Option                                 | Experience group  |                  | Control group     |                  |
|--|-------------------|------------------|-------------------|------------------|
|  | Before experiment | After experiment | Before experiment | After experiment |
| Static parameters of total leave       | 2.907±0.5576      | 2.816±0.5212     | 2.676±0.3761      | 2.785±0.4049     |
| Front and rear axial static parameters | 2.031±0.7110      | 2.146±0.7318     | 2.115±0.6783      | 2.092±0.6716     |
| Left and right axial static parameters | 2.449±0.5256      | 2.499±0.4740     | 2.268±0.6073      | 2.300±0.5264     |

Table 2. Effect of joint rehabilitation training on the injured side of aerobics athletes with joint injury.

| Option                                 | Experience group  |                  | Control group     |                  |
|--|-------------------|------------------|-------------------|------------------|
|  | Before experiment | After experiment | Before experiment | After experiment |
| Static parameters of total leave       | 3.769±0.7368      | 2.737±0.7217     | 3.713±0.6606      | 2.876±0.6617     |
| Front and rear axial static parameters | 2.509±0.4740      | 2.197±0.4675     | 2.526±0.4859      | 2.301±0.4811     |
| Left and right axial static parameters | 3.506±0.6247      | 2.648±0.6024     | 3.493±0.6273      | 2.439±0.3948     |

human body is not fully recovered, over-training will occur. If the athletes do not make professional correction when they are overtraining, the physical quality of the body will be reduced, and there will be many complications. When athletes perform aerobics, they often use difficult combination movements. These actions will make the human body bear a heavy load and easily cause joint damage. When a person's body load is large, the strength that the foot bears when contacting with the ground is several times the weight of the trainer's body, and when a person jumps, the strength that the person's body bears even reaches more than four times. When athletes continue to train and carry out high-difficulty movements, bare joint injury is inevitable. In general jumping, the naked joint repeatedly collides and squeezes, which will cause great damage to the naked joint. Under normal sports conditions, although some joint injuries will be caused by athletes, they will not show very obvious symptoms, but it does not mean that they are not injured. Some of these injuries are serious or some are light, but the physical injury is a matter of certainty. For the physical injury has formed, we need to carry out regular treatment.

However, in case of very serious injury, formal treatment must be carried out. If it is not handled properly, there will be irreversible injury consequences.

## CONCLUSION

Through the investigation and research in this paper, it can be seen that the joint injuries of aerobics athletes are mainly manifested in the waist, knee and ankle joints of athletes, followed by the shoulders, elbows and wrists of athletes, and the joint rehabilitation training has improved the joint injuries of aerobics athletes. Based on this research result, attention should be paid to the protection of waist, knee, ankle, shoulder, elbow and wrist in the training and competition of aerobics athletes, and regular joint rehabilitation training should be carried out in time after the training of aerobics athletes, and the improvement strategy should be further improved according to the recovery of athletes, so as to avoid irreversible injury to athletes.

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

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**AUTHORS' CONTRIBUTIONS:** The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Yuehong Li: writing and execution.

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