

FATIGUE AND REHABILITATION IN THE TRAINING OF GYMNASTS

FADIGA E REABILITAÇÃO NO TREINAMENTO DE GINASTAS

FATIGA Y REHABILITACIÓN EN EL ENTRENAMIENTO DE GIMNASTAS



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ABSTRACT

Introduction: Aerobic gymnastics requires a lot of physical ability and endurance. Fatigue is an inevitable consequence of intrinsic movements with a high intensity related to the sport. **Objective:** Analyze the rehabilitation strategy of sports fatigue in aerobic gymnastics athletes caused by training. **Methods:** 20 volunteer aerobics students in colleges and universities were recruited and divided into experimental and control groups. High-intensity aerobic gymnastics training was performed where the experimental group used a combined exercise fatigue recovery scheme, while the control group used only traditional walking and stretching. **Results:** Lasting 40 minutes, the post-exercise fatigue rehabilitation protocol showed a decreasing trend in muscle stress, while the control group evidenced a fluctuating decreasing trend. The recovery frequency of the experimental group was higher than that of the control group. **Conclusion:** The combined method of rehabilitation training mentioned in this paper can better regulate the heart rate of athletes, reduce the level of fatigue, and transform passive relaxation into active sports rehabilitation, engaging the enthusiasm of sport in athletes. Therefore, the scheme proposed in this paper has better practical significance and practical value. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Gymnastics; Muscle Fatigue; Rehabilitation.

RESUMO

Introdução: A ginástica aeróbica requer muita habilidade física e resistência. A fadiga é uma consequência inevitável dos movimentos intrínsecos com alta intensidade relacionados ao esporte. **Objetivo:** Analisar a estratégia de reabilitação da fadiga esportiva nos atletas de ginástica aeróbica ocasionada pelo treinamento. **Métodos:** 20 voluntários estudantes de aeróbica em faculdades e universidades foram recrutados e divididos em grupo experimental e controle. Foi realizado um treinamento de ginástica aeróbica de alta intensidade onde o grupo experimental utilizou um esquema de recuperação de fadiga de exercício combinado, enquanto o grupo de controle utilizou apenas a caminhada e o alongamento tradicionais. **Resultados:** Com duração de 40 minutos, o protocolo de reabilitação de fadiga após o exercício mostrou uma tendência decrescente do estresse muscular, enquanto o grupo controle evidenciou uma tendência decrescente flutuante. A frequência de recuperação do grupo experimental foi maior do que a do grupo controle. **Conclusão:** a utilização do método combinado de treinamento de reabilitação mencionado neste trabalho pode regular melhor a frequência cardíaca dos atletas, reduzir o nível de fadiga e transformar o relaxamento passivo em reabilitação esportiva ativa, engajando um entusiasmo do esporte nos atletas. Portanto, o esquema proposto neste trabalho tem melhor significado prático e valor prático. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Ginástica; Fadiga Muscular; Reabilitação.

RESUMEN

Introducción: La gimnasia aeróbica requiere mucha capacidad física y resistencia. La fatiga es una consecuencia inevitable de los movimientos intrínsecos de alta intensidad relacionados con el deporte. **Objetivo:** Analizar la estrategia de rehabilitación de la fatiga deportiva en atletas de gimnasia aeróbica causada por el entrenamiento. **Métodos:** Se reclutaron 20 voluntarios estudiantes de aeróbica en colegios y universidades y se dividieron en grupo experimental y de control. Se realizó un entrenamiento de gimnasia aeróbica de alta intensidad en el que el grupo experimental utilizó un esquema combinado de recuperación de la fatiga del ejercicio, mientras que el grupo de control sólo utilizó la caminata y los estiramientos tradicionales. **Resultados:** Con una duración de 40 minutos, el protocolo de rehabilitación tras la fatiga mostró una tendencia a la disminución del estrés muscular, mientras que el grupo de control evidenció una tendencia a la disminución fluctuante. La frecuencia de recuperación del grupo experimental fue mayor que la del grupo de control. **Conclusión:** El uso del método combinado de entrenamiento de rehabilitación mencionado en este artículo puede regular mejor el ritmo cardíaco de los atletas, reducir el nivel de fatiga y transformar la relajación pasiva en una rehabilitación deportiva activa, despertando el entusiasmo por el deporte en los atletas. Por lo tanto, el esquema propuesto en este trabajo tiene mayor importancia práctica y valor práctico. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Gimnasia; Fatiga Muscular; Reabilitación.



INTRODUCTION

Aerobics can keep fit and has certain artistry. As a comprehensive sports form, it combines music, dance and aesthetics.¹ It takes the basic movements of gymnastics as the main body, combines various technical movements, special specified movements and high-difficulty basic movements, and carries out special design and combination according to the structure, path and rhythm, so as to use music for rhythmic training.² According to Xiang group training theory, aerobics belongs to the skill sports in difficult and beautiful sports. Its technical characteristics are that the movement range of the athletes is large, and they can accurately complete the display of technical movements.³ During this process, the muscles quickly exert force to “accelerate” and “brake”, so that the speed of the movement changes, thus reflecting the sense of strength of the movement. Therefore, aerobics requires athletes to have a high level of special technical ability, and needs athletes to be able to perform technical movements perfectly.⁴ In order to achieve high-quality training effect and competitive performance, some Aerobics athletes blindly carry out long-term and high-intensity training, instead of preparatory and finishing exercises, resulting in a significant increase in the probability of lumbar muscle injury. For Aerobics students, waist muscle strain will have a huge negative impact on their training and competition.⁵ While causing physical and mental pain, it will also reduce the competitive development space of some high-level aerobics students, thus greatly wasting the human and material resources needed for teaching. Therefore, adequate fatigue rehabilitation after sports is of great significance to relieve athletes’ muscle pressure, improve their mental state and reduce sports injuries.⁶

METHOD

On the basis of a certain understanding of the current Aerobics Athletes’ exercise fatigue recovery, the author has completed a combined exercise fatigue recovery program with the help of common relaxation equipment according to the serious problem of exercise fatigue in the core parts. Subsequently, through expert interviews, we communicated with medical experts, sports experts, front-line physical education teachers and Aerobics Athletes’ representatives to solicit their opinions and suggestions on the scheme, and combined with previous research experience, we further modified the scheme of this paper to obtain the final scheme. After designing the final version of the training program, 20 students were recruited from College Aerobics students according to the method of volunteer recruitment. The study and all the participants were reviewed and approved by Ethics Committee of Hechi University (NO.2020HCUCTD). They were divided into experimental group and control group by random sampling.

In order to reduce the human and material costs during the experiment, the heart rate monitoring function of a brand of sports bracelet is used for the test. The athletes wear relevant Bracelet equipment and complete the preparation of the experimental state when the heart rate is 180-200. Then, the heart rate of the bracelet of the experimental group and the control group was recorded by a specially assigned person at an interval of 10 minutes. In order to ensure the preciseness of

Table 1. Subjective feeling level.

Subjective feeling	Level	The heart rate range in 1 minute
Very relaxed	6-7	60-70
Easy	8-9	80-90
Relaxed	10-11	100-110
A little tired	12-13	120-130
tired	14-15	140-150
very tired	16-17	160-170
Exhausted	18-20	180-200

the experiment and reduce the impact of single error, the experiment takes three days as a cycle. On the first day, the relevant sports training, relaxation and data acquisition are carried out. On the second and third days, the rest is as much as possible under the condition of basic training, so as to ensure the energy of the next cycle experiment. This can ensure that the athletes are in the best condition and reduce the impact of physical discomfort.

RESULTS

Status of exercise fatigue of bodybuilding athlete training process

In order to study the fatigue rehabilitation of aerobics exercise, we must fully understand the fatigue during the training process of the current aerobics athletes. The results of the questionnaire survey are shown in Table 2 and Table 3.

As shown in Table 2, when asked about the most fatigued part after high-intensity aerobics training, each person can choose two parts as multiple choices. According to statistics, 156 athletes said that after high-intensity aerobics training, the most tired part was the thigh, accounting for 64.20% of the total number; 115 athletes said that the most tired part was the waist, accounting for 47.33% of the total number; 94 athletes said that the most tired part was the arm position, accounting for 38.68% of the total number; 68 athletes said that the most tired part was the calf position, accounting for 27.98% of the total number.

As shown in Table 3, when asked about the commonly used sports fatigue recovery methods, different athletes have their own preferences. 172 athletes said that after high-intensity aerobics training, the most commonly used method to recover exercise fatigue was sleep, accounting for 70.78% of the total number; 155 athletes said that the most commonly used method to recover sports fatigue was massage and stretching, accounting for 63.79% of the total number; 89 athletes said that nutrition intervention was the most commonly used method to recover sports fatigue, accounting for 36.63% of the total number; 124 athletes said that the most commonly used method to recover sports fatigue was relaxation exercise, accounting for 51.03% of the total number; 69 athletes said that the most commonly used method to recover sports fatigue was warm water bath, accounting for 28.40% of the total number; Another 43 athletes said that listening to music was the most common way to recover from sports fatigue, accounting for 17.70% of the total number. It can be seen that at present, there are still some deviations in athletes’ cognition of sports fatigue recovery. This topic is multi topic. Each athlete can choose two recovery methods. At present, the most common two are sleep and massage stretching. Massage stretching is a relatively scientific means of sports relaxation, which can also reduce the muscle fatigue of athletes to a certain extent. However, relatively speaking, there is still passive recovery in the process of sports fatigue recovery, that is, through massage or sleep, the recovery of fatigue is completed, rather than according to the subjective initiative of athletes.

Table 2. Most tired part after high-intensity aerobics training.

Option	Thigh	Waist	Arm	Calf
Number of people	156	115	94	68
percentage	64.20%	47.33%	38.68%	27.98%

Table 3. Common exercise fatigue rehabilitation methods of Aerobics Athletes.

Option	Sleep	Massage stretching	Nutrition intervention	Relaxation exercise	Warm water bath	Music
Number of people	172	155	89	124	69	43
percentage	70.78%	63.79%	36.63%	51.03%	28.40%	17.70%

Effect of relaxation training on the recovery of Aerobics athletes from exercise fatigue

As shown in Figure 1, within 40 minutes of exercise rehabilitation training, the heart rate of the experimental group showed an obvious downward trend, while that of the control group showed a fluctuating downward trend. In general, the recovery frequency of the experimental group was much higher than that of the control group. In the following 50-60 minutes, the heart rate of the two groups of athletes decreased slightly, of which the experimental group remained almost flat and the decline was extremely low, while the control group was still gradually decreasing. From the overall trend line, it can be seen that the experimental group did not change much within 10 minutes before the start, and decreased at a constant speed from 10 minutes to 40 minutes until it was relatively stable, while the control group showed obvious fluctuation and platform nature. Although it also decreased, there was often a relatively gentle curve between each decline, so the overall efficiency was lower than that of the experimental group.

According to Table 1, the change trend of subjective feeling in Figure 2 can be obtained by sorting and summarizing the heart rate. It can be seen from the figure that after the exercise training, the subjective feeling of both of them belongs to the state of exhaustion. Then, with the continuous progress of the exercise rehabilitation, the data of the experimental group is 13.87, showing the level of "tired", and the data of the control group is 16.13, showing the situation of "very tired". At 60 minutes, the data of the experimental group decreased to 12.67, which was "slightly tired", while the data of the control group was 14.39, which was still "tired". It can be seen that, in the recovery process of exercise fatigue, the exercise fatigue rehabilitation program proposed in this paper is more effective than the traditional walking and stretching methods.

DISCUSSION

1. Carry out targeted training. For athletes with different physical qualities, coaches should follow the principle of "seeking common ground while reserving differences" and balance the training intensity under the condition of achieving the common training effect. In this process, athletes need to adjust the pressure by themselves.

2. It is necessary to pay attention to the psychological state of athletes and ensure their sleep quality. The coach needs to understand the psychological state of the athletes and treat them differently and reasonably divide the training intensity. On this basis, he tries to communicate with the athletes to solve the problems, reduce their pressure, and ensure that the athletes can concentrate on the training process. Athletes themselves need to adjust their psychological state reasonably and ensure adequate sleep. During sleep, people's physical feeling will be reduced, which is the best time to relieve fatigue. Therefore, athletes need to ensure adequate sleep time and quality sleep.

3. Athletes need to self regulate their physical state and pay attention to diet. Through a reasonable diet, they can effectively relieve physical fatigue and supplement the energy lost during sports training, so as to improve their physical function. During the period of illness and the physiological period of female athletes, coaches need to reduce the time of high-intensity training to ensure the normal and reasonable development of their physical functions.

4. It is necessary to make sufficient preparations before training and organize activities after training, so as to reduce the risk of sports injury and prevent fatigue. Finishing activities after sports are also helpful to improve physical fitness and prevent sports fatigue. This is because the influence of sports on Athletes' bodies will not stop completely with the stop of sports. During strenuous exercise, physical exercise is usually performed under hypoxic conditions. If an athlete suddenly stops after high-intensity exercise and all parts of the body are still working to make up for the lack of oxygen during physical exercise, it will lead to adverse reactions. Therefore, some post

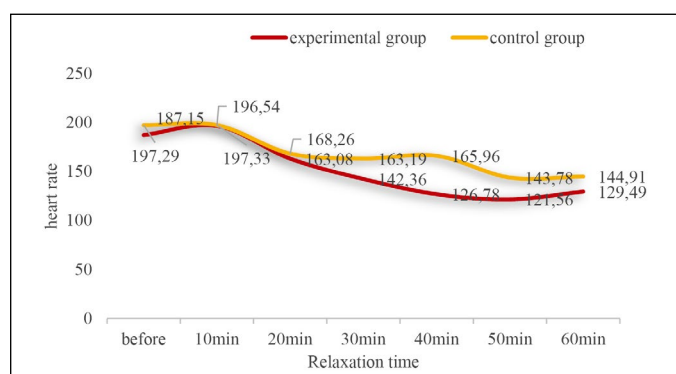


Figure 1. Change trend of heart rate in experimental group and control group.

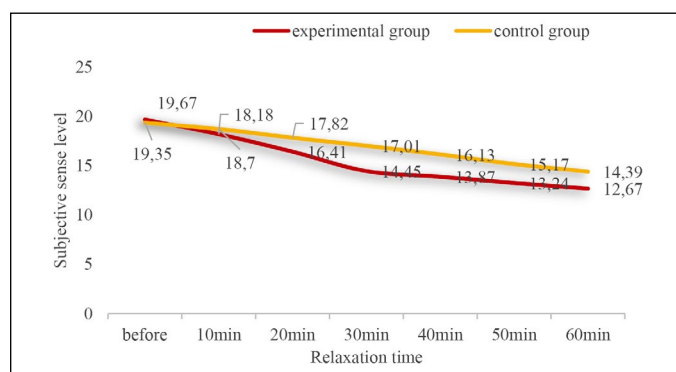


Figure 2. Change trend of subjective sensation in the experimental group and the control group.

exercise nursing activities are essential. After exercise, the body is generally in a relaxed state. At this time, finishing activities can regulate metabolism and relieve physical fatigue. The design of activity intensity after exercise should not be too high, mainly moderate exercise such as jogging and some breathing exercises. At the same time, it can also be seen from the study that even after one hour of rehabilitation training and sedentary recovery, the subjective feelings of the two are still in a relatively tired state, which is also related to the actual situation of sports training. Although fatigue rehabilitation training alleviates muscle tension and reduces sports injury, it cannot eliminate the subjective feelings of athletes instantly. Therefore, until the end of the experiment, the two groups of athletes are in a relatively tired state, and need to adjust for a longer time to recover to the initial state.

CONCLUSION

Aerobics is a relatively comprehensive sports, so the attention to the rehabilitation of athletes' sports fatigue is more prominent. However, in the existing Aerobics Education, the rehabilitation training is often not paid enough attention. The research in this paper shows that the combined rehabilitation training method mentioned in this paper can better regulate the athletes' heart rate, reduce the fatigue feeling score, and change passive relaxation into active sports rehabilitation, so as to mobilize the athletes' sports enthusiasm. Therefore, the scheme proposed in this paper has better practical significance and practical value.

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