RELAXATION TRAINING TO RELIEVE SPORTS FATIGUE IN VOLLEYBALL

TREINAMENTO DE RELAXAMENTO NO ALÍVIO DA FADIGA ESPORTIVA NO VOLEIBOL

ENTRENAMIENTO DE RELAJACIÓN EN EL ALIVIO DE LA FATIGA DEPORTIVA EN VOLEIBOL

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ABSTRACT

Introduction: Volleyball demands from athletes in continuous training a strong engagement and the use of sport endurance techniques, and their relaxation after training is indispensable. Objective: This paper investigates whether relaxation training after volleyball is beneficial in the competitive levels of volleyball players. Methods: 60 volleyball players aged 20-23 years were selected as participants in the experiment. They received relaxation training for 8 weeks, and heart rate changes were recorded before and after relaxation. Results: The heart rate of athletes in a resting state before training changed from 79.93 in the first week to 81.07 in the eighth week; after volleyball practice, the heart rate of athletes before relaxation varied from 136.13 to 140.73 from the first week to the eighth week; after the introduction of relaxation training, the heart rate of athletes was 84.71, and the minimum heart rate recorded was 80.74. It can be seen that relaxation training allows athletes to recover quickly to a normal state and achieve the goal of relaxation. Conclusion: Adding a relaxation training program to relieve fatigue after volleyball showed a useful for improving the performance of volleyball players. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Volleyball; Fatigue; Relaxation Therapy.

RESUMO

Introdução: O voleibol exige dos atletas em formação contínua um forte engajamento e o uso de técnicas de resistência ao esporte, sendo indispensável o seu relaxamento após o treino. Objetivo: Este artigo investiga se o treinamento de relaxamento após o voleibol é benéfico nos níveis competitivos dos jogadores de voleibol. Métodos: 60 jogadores de voleibol de 20 a 23 anos de idade foram selecionados como participantes do experimento. Eles receberam treinamento de relaxamento por 8 semanas, registrando-se as alterações do ritmo cardíaco antes e depois do relaxamento. Resultados: O ritmo cardíaco dos atletas em estado de repouso antes do treinamento mudou de 79,93 na primeira semana para 81,07 na oitava semana; após a prática do voleibol, o ritmo cardíaco dos atletas antes do relaxamento variou de 136,13 a 140,73 da primeira semana para a oitava semana; após a introdução do treinamento de relaxamento, a frequência cardíaca dos atletas foi de 84,71, sendo a frequência cardíaca mínima registrada de 80,74. Pode-se observar que o treinamento de relaxamento permite aos atletas se recuperarem rapidamente para um estado normal e alcançarem o objetivo de relaxamento. Conclusão: Adicionar o programa de treinamento de relaxamento para aliviar a fadiga após o vôlei evidenciou-se útil para melhorar o desempenho dos jogadores de vôlei. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

***Descritores*:** *Voleibol; Fadiga; Terapia de Relaxamento.*

RESUMEN

Introducción: El voleibol exige de los deportistas en entrenamiento continuo un fuerte compromiso y la utilización de técnicas de resistencia deportiva, siendo imprescindible su relajación después del entrenamiento. Objetivo: Este trabajo investiga si el entrenamiento de relajación después del voleibol es beneficioso en los niveles competitivos de los jugadores de voleibol. Métodos: 60 jugadoras de voleibol de entre 20 y 23 años fueron seleccionadas como participantes en el experimento. Recibieron entrenamiento de relajación durante 8 semanas y se registraron los cambios en la frecuencia cardiaca antes y después de la relajación. Resultados: La frecuencia cardíaca de los deportistas en estado de reposo antes del entrenamiento varió de 79,93 en la primera semana a 81,07 en la octava semana; tras la práctica del voleibol, la frecuencia cardíaca de los deportistas antes de la relajación varió de 136,13 a 140,73 desde la primera semana hasta la octava semana; tras la introducción del entrenamiento de relajación, la frecuencia cardíaca de los deportistas fue de 84,71, y la frecuencia cardíaca mínima registrada fue de 80,74. Se puede observar que el entrenamiento de relajación permite a los atletas recuperarse rápidamente a un estado normal y alcanzar el objetivo de la relajación. Conclusión: Añadir el programa de entrenamiento de relajación para aliviar la fatiga después del voleibol se mostró útil para mejorar el rendimiento de los jugadores de voleibol. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

***Descriptores*:** *Voleibol; Fatiga; Terapia por Relajación.*

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INTRODUCTION

Athletes' fatigue in volleyball is mainly caused by unreasonable training and excessive exercise load. This can easily lead to physical weakness or muscle pain after volleyball training.[1] The unreasonable training rhythm in the training process is easy to cause unscientific training cycle and irregular rest time, as well as physical fatigue after volleyball. If the psychological quality and mental state of volleyball players are not good, this may lead to problems such as excessive pressure or bad mood during sports.[2] Therefore, the athletes cannot reach the normal level during the competition. In addition, athletes have no sense of self-protection and rush to participate in volleyball training without fully recovering their physical condition will cause fatigue, which will hinder the long-term development of volleyball players.[3] Volleyball is a combination of aerobic and anaerobic sports. The performance of athletes depends on their developed physical qualities, such as body agility, speed, strength and vertical jumping, in order to better predict the perfect decision-making ability. To complete repeated jumping movements, fast hitting movements, and various fake movements, not only requires high athletic quality, but also increases the risk of injury to lower limb joint muscles.[4] For volleyball players, the flexibility level and strength of lower limb muscles are important qualities to complete the competition and reduce injuries. However, the reality shows that the physical flexibility and strength level of Chinese volleyball players are relatively weak.[5] Therefore, in the process of completing volleyball teaching and training, this not only limits the exertion of volleyball skills and the efficiency of volleyball training, but also increases the risk of physical injury caused by volleyball, so it will reduce their enthusiasm to practice volleyball. Relaxation training is of great significance to improve sports performance.[6] Therefore, this paper studies the effect of relaxation training on alleviating the fatigue of volleyball players after sports, and then discusses the application and development of relaxation training in volleyball teaching and training.[7] This study provides a theoretical basis for enriching the volleyball training in China, preventing the physical quality, physique and sports injury of volleyball players, and finally providing a reference value for improving the training effect of volleyball players.[8]

METHOD

Research object

In this paper, 60 volleyball players were selected as the experimental objects, and the selected objects should keep the body differences as small as possible. The study and all the participants were reviewed and approved by Ethics Committee of Baoshan University (NO.BSUST102). The average age of the subjects is 20-23 years old, the training period is 1-2 years, the average height is 175-177 cm, and the average weight is 71-76 kg. Compare the situation of 60 volleyball players. First, measure the change of heart rate in the quiet state before the start of training, and then conduct relaxation training to relieve fatigue for volleyball players after daily high-intensity training, and measure the change of heart rate after relaxation training. During the eight weeks, the basic training volume of the athletes remained unchanged and kept consistent with the daily diet and rest. The specific conditions of the experimental subjects are shown in Table 1.

Table 1. Basic information of the subjects.

Age	22.147±1.216
Years of training	2.360±0.519
Height (cm)	175.651±1.489
Body weight (kg)	73.776±2.398

Experimental method

In this experiment, the change of heart rate is selected as the measurement standard. The change of heart rate is the variable that can directly reflect the intensity of anaerobic exercise, so the volleyball players can form a control. So during the eight-week experiment, let the volleyball players keep the most basic training mode, and successively measure and record the change of heart rate in the quiet state before the start of training, and the change of the maximum heart rate of the athletes during the exercise, On this basis, relaxation training was added to the training of volleyball players, and the changes of heart rate before and after relaxation after volleyball were recorded.

RESULTS

Effect of relaxation training on volleyball players

Generally, the greater the heart rate, the greater the cardiac output, and the more able to complete high-intensity exercise, but the greater the heart rate, the smaller the cardiac output, which is not conducive to exercise. The heart rate of volleyball players who have been exercising for a long time is lower when they are quiet, but it is not obvious that the heart rate increases when they exercise with general intensity; The heart rate of the maximum intensity exercise is higher than that of the average person, and can complete the exercise with high intensity. Volleyball players need to run, jump, hit and other actions in the sports field for a long time. These actions seem to be of little intensity, but they will become high--intensity sports with the accumulation of time, which is also the reason why volleyball players will be tired. The heart rate of volleyball players is measured when they are quiet, that is, before any training. Chart 2 shows the heart rate changes of athletes from the first week to the eighth week: 79.93, 79.48, 80.42, 78.67, 78.56, 80.86, 77.98, 81.07.

It can be seen from Figure 1 that when the athletes do not have any training, the heart rate range is about 77-81, which is relatively stable. Because the athletes often carry out high-intensity training, the heart rate of volleyball players in a quiet state is higher than that of ordinary people. It is not difficult to see from Figure 1 that the heart rate reaches the lowest point in the seventh week, which is 77.98 at this time, and reaches the highest point in the eighth week, which is 81.07. Due to the requirements of accuracy, The trend of the image is more tortuous, but the actual value is not different, which is consistent with the general heart rate changes of athletes.

As the amount of exercise increases, the oxygen consumption and heart rate also increase. The most popular theoretical maximum heart rate calculation formula is: maximum heart rate=220 - actual age. Volleyball players will participate in aerobic training, high-intensity anaerobic training and some strength training in their daily training. These training

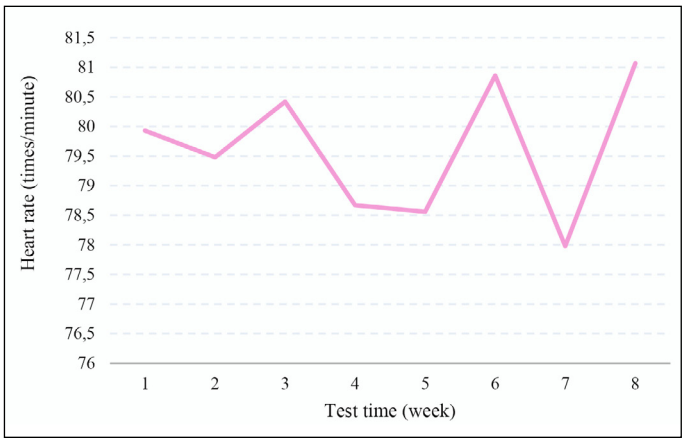

Figure 1. Changes of heart rate of athletes in quiet state before training.

will greatly improve their heart rate, especially aerobic training. Aerobic training will make athletes' heart rate rise significantly, and will soon reach the maximum heart rate. After a long period of training, the maximum heart rate of volleyball players will also be higher than that of ordinary people, so the change of the maximum heart rate of volleyball players during exercise is measured. Figure 2 shows the maximum heart rate change of volleyball players during the first week to the eighth week: 176.36, 178.76, 179.22, 177.83, 180.1, 182.32, 176.89, 174.81.

It can be seen from Figure 2 that the heart rate of volleyball players during exercise is significantly higher than that during quiet state, and they will always keep their body moving fast to defend the attacking volleyball. During volleyball exercise, the minimum value of the maximum heart rate within eight weeks appears in the eighth week, while the maximum value appears in the sixth week, and the maximum heart rate from the first week to the third week shows an upward trend, There was a small decline in the fourth week, but in the next few weeks, the maximum value of the heart rate was in the stage of steady rise, and reached the peak in the sixth week, at this time, the value was 182.32, and then fell steadily, and fell to the minimum value in the eighth week, the value was 174.81. According to the image data, after eight weeks of comparison, the maximum heart rate of the first week and the eighth week is not much different. Although the curve on the image is more tortuous, the actual range of change is not very large.

Effect of relaxation training on heart rate of volleyball players

Volleyball players will feel physically and mentally tired after high--intensity aerobic training, anaerobic training and strength training, and their heart rate will also be at a high level at this time, which may increase the pressure. If they only adjust their heart rate by resting, the process will be relatively dull and slow, which is not conducive to the adjustment of volleyball players. Figure 3 shows the changes of heart rate before relaxation after volleyball. The changes of heart rate from the first week to the eighth week are: 136.13, 138.72, 142.72, 140.23, 141.83, 142.21, 143.03, 140.73 before relaxation. At the end of the exercise, volleyball is still in an excited state, and the heart rate at this time is higher than the normal heart rate.

It is not difficult to see from Figure 3 that from the first week to the third week, the heart rate of volleyball players is in the rising stage. According to the data, the third week is the peak of heart rate, which is 142.72. At this time, the heart rate is slightly higher than that of the sixth week, and after the third week, the heart rate has decreased for a short period, but it has increased slightly at random. The stage before relaxation training for volleyball players is a relatively exciting stage. At this time, the heart rate of athletes is still high. Although it is at the end of the exciting stage, it has a certain impact on the recovery of athletes.

High-intensity volleyball confrontation training is a great test of physical fitness for volleyball athletes. At this time, the body needs to adapt to a higher heart rate state. And after high-intensity volleyball sports, if you want to quickly recover to a stable state, you need to carry out relaxation training, just as track and field athletes will carry out appropriate walking to relax after endurance training to achieve the goal of rapid recovery, For volleyball players who have completed high-intensity training, relaxation training at this moment will quickly restore their heart rate to a stable state, so that their body and mind will be relaxed, and will not feel too much pressure accumulation, which will help athletes adjust their body. Figure 4 shows the heart rate changes of volleyball players from the first week to the eighth week of relaxation training after volleyball exercise: 83.33, 80.75, 84.71, 83.4, 83.08, 81.26, 82.5.

According to Figure 4, it can be clearly seen that volleyball players will accelerate past the exciting stage and transition to the calm stage after relaxation training. If no relaxation training is carried out, the athletes' excited state will last for a long time, which has a certain negative impact on the rest and adjustment after sports. Quickly entering a calm state is conducive to the recovery of the physical functions of volleyball players, and is conducive to the athletes' dietary supplement after exercise. Generally speaking, if the athletes have just finished training, they will not have a good appetite for food, but at this time, the athletes need to supplement a certain amount of carbon, water, fat and protein, so when the athletes recover to a calm state after relaxation training, It also helps athletes to supplement nutrients.

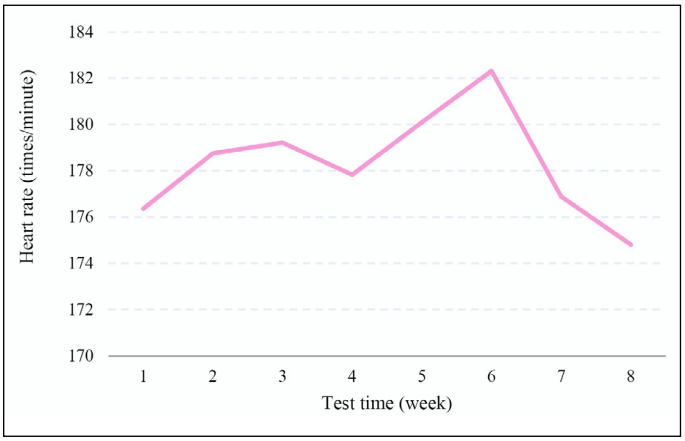

Figure 2. The change of maximum heart rate in volleyball.

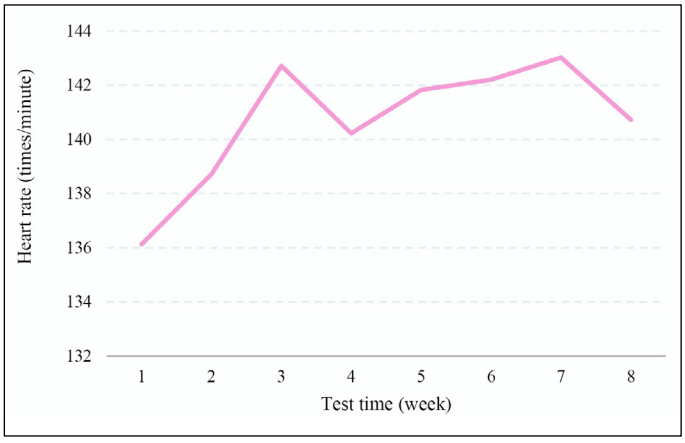

Figure 3. Changes of heart rate of athletes after volleyball before relaxation.

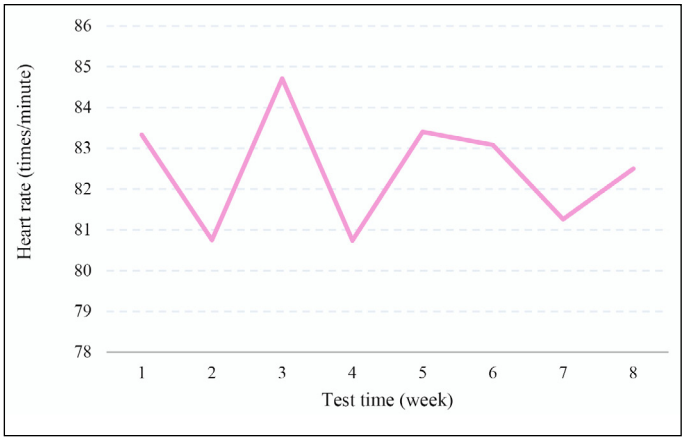

Figure 4. Changes of heart rate after volleyball athletes relax.

DISCUSSION

Volleyball training is very heavy, which makes volleyball players more prone to fatigue. If there is physical exhaustion or muscle overwork, which

cannot be avoided in time, it will affect the physical health of athletes. Therefore, it is very important to strengthen the study of athletes' physical characteristics and relieve fatigue in volleyball training. The physical fitness of volleyball players is relatively good, which makes athletes have good innate sports cells. Long-term physical exercise can increase the physical fitness of athletes, so as to encourage athletes to better exercise ability. If the physical quality of volleyball players decreases due to problems such as body parts, it will increase the fatigue of the players. In volleyball training, if the physical fitness of the players is not relieved in time, and at the same time in the lack of rest and in the rush of training, volleyball players will lead to a decline in the quality of training. One of the main test items of athletes is the test of biochemical indicators. Through the test, we can know the physical condition evaluation of volleyball players in high-intensity training. When measuring the hemoglobin index, if the hemoglobin level of volleyball players is in a declining state, volleyball players will feel tired, so volleyball players need to supplement nutrients in time. At the same time, we can judge whether the urine protein level test result is positive or negative. If the test result is positive and the test result is negative the next morning, it means that the physical activity index of athletes is normal; However, if the test result is still positive the next morning, the volleyball player may feel very tired. There are also some indicators for diagnosis, including blood urea, saliva pH, urobilinogen, blood lactic acid and other indicators, in order to clarify the normal indicators, compare the test results with the normal results, and determine whether volleyball players have fatigue during training. In short, for volleyball players, a lot of sports are easy to produce fatigue, so relaxation training is particularly important. Relaxation training helps to improve body functions, thus helping to achieve good training results, and helping athletes improve sports ability.

CONCLUSION

Volleyball requires players to be in a tense state at all times. They not only need to pay attention to the position of the ball drop point, but also need to estimate the ball drop point through judgment and pre-judgment. This requires not only the cooperation of the team, but also the ability of individuals to move quickly in a short time. This is undoubtedly a test for volleyball players. Volleyball players will participate in high-intensity physical training in their daily training. This study uses the easy-to-measure and intuitive heart rate changes to reflect whether the athletes' relaxation training will help improve their skills. The results show that volleyball players will carry out fatigue relief relaxation training after high-intensity training, which will restore the high level heart rate to the normal and calm heart rate. If the heart rate level is high, Volleyball players will miss the best time to supplement body nutrients, and there will be some muscle loss, so quickly reduce the heart rate level, which can enable volleyball players to eat immediately after relaxation training, which not only helps to relax the body and mind, but also can timely supplement the carbohydrates, fats and proteins needed by the body, which is conducive to the rapid recovery of athletes' body functions.

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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. Guohui Qin: writing and execution.

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