MUSCULOARTICULAR EVALUATION OF THE HYDROTHERAPY EFFECTS ON BASKETBALL PLAYERS POST-TRAINING RECOVERY

AVALIAÇÃO MUSCULO-ARTICULAR DOS EFEITOS DA HIDROTERAPIA NA RECUPERAÇÃO PÓS-TREINO EM JOGADORES DE BASQUETEBOL

EVALUACIÓN MUSCULO-ARTICULAR DE LOS EFECTOS DE LA HIDROTERAPIA EN LA RECUPERACIÓN POST-ENTRENAMIENTO EN JUGADORES DE BALONCESTO

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ABSTRACT

Objective: To evaluate the effects of hydrotherapy on post-training recovery of basketball players. Methods: 60 basketball players from the sports representative team were divided equally into test and control group for evaluation according to the Partridge method. The experimental group received hydrotherapy for 15 minutes after intense winter training. Pain degrees in joint flexion and extension, adduction, external rotation, and internal rotation were evaluated. Results: the HL value of blood immediately after 800m hydrotherapy swimming was not significantly different between the experimental group and the control group by t-test (P>0.05). Before treatment, there was no significant difference in the Partridge score between the two groups (P<0.01). The improvement of the Partridge score in the two groups of patients was significantly reduced after treatment (P<0.01), and the improvement of the experimental group was significantly better than that of the control group (P<0.01). Before treatment, there was no significant difference between the two groups (P<0.01). After treatment, it was significantly reduced (P<0.01), but the experimental group's improvement was significantly better than the control group (P<0.01). Conclusion: The method of introducing hydrotherapy as post-workout swimming has a significant effect on relieving swelling of the brachial and quadriceps muscles. However, intense swimming may affect the effect of muscle recovery. ***Level of evidence II; Therapeutic studies - investigation of treatment results***.

Keywords: Hydrotherapy; Basketball; Recovery of Function.

RESUMO

Objetivo: Avaliar os efeitos da hidroterapia sobre a recuperação pós-treinamento dos jogadores de basquete. Métodos: 60 jogadores de basquetebol da equipe de representantes esportivos foram divididos igualmente em grupo teste e controle para avaliação de acordo com o método Partridge. O grupo experimental recebeu hidroterapia por 15 minutos após o treino intenso de inverno. Foram avaliados os graus de dor em flexão e extensão das articulações, adução, rotação externa e rotação interna. Resultados: o valor de HL do sangue imediatamente após a natação hidroterápica de 800m não foi significativamente diferente entre o grupo experimental e o grupo controle por teste t (P>0,05). Antes do tratamento, não houve diferença significativa na pontuação de Partridge entre os dois grupos (P<0,01). A melhora da pontuação de Partridge nos dois grupos de pacientes foi significativamente reduzida após o tratamento (P<0,01), e o desenvolvimento do grupo experimental foi significativamente melhor que a do grupo controle (P<0,01). Antes do tratamento, não houve diferença significativa entre os dois grupos (P<0,01). Após o tratamento, foi significativamente reduzido (P<0.01), mas o desenvolvimento do grupo experimental foi significativamente melhor que a do grupo controle (P<0.01). Conclusão: O método de introduzir a hidroterapia como natação pós-treino tem um efeito significativo no alívio do inchaço dos músculos braquial e quadríceps. No entanto, a natação intensa pode afetar o efeito de recuperação muscular. ***Nível de evidência II; Estudos terapêuticos – investigação de resultados de tratamento***.

Descritores: *Hidroterapia; Basquete; Recuperação de Função Fisiológica.*

RESUMEN

Objetivo: Evaluar los efectos de la hidroterapia en la recuperación post-entrenamiento de los jugadores de baloncesto. Método: 60 jugadores de baloncesto del equipo de representación deportiva fueron divididos equitativamente en grupo de prueba y grupo de control para su evaluación según el método Partridge. El grupo experimental recibió hidroterapia durante 15 minutos después de un entrenamiento invernal intenso. Se evaluaron los grados de dolor en la flexión y extensión de la articulación, la aducción, la rotación externa y la rotación interna. Resultados: el valor de HL de la sangre inmediatamente después de 800 m de natación con hidroterapia no fue significativamente diferente entre el grupo experimental y el grupo de control mediante la prueba t (P>0,05). Antes del tratamiento, no hubo diferencias significativas en la puntuación Partridge entre los dos grupos (P<0,01). La mejora de la puntuación

Partridge en ambos grupos de pacientes se redujo significativamente después del tratamiento (P<0,01), y la mejora del grupo experimental fue significativamente mejor que la del grupo de control (P<0,01). Antes del tratamiento, no hubo diferencias significativas entre los dos grupos (P<0,01). Después del tratamiento, se redujo significativamente (P<0,01), pero el desarrollo del grupo experimental fue significativamente mejor que la del grupo de control (P<0,01). Conclusión: El método de introducción de la hidroterapia como natación post-entrenamiento tiene un efecto significativo en el alivio de la hinchazón de los músculos braquiales y del cuádriceps. Sin embargo, la natación intensa puede perjudicar el efecto de recuperación muscular. ***Nivel de evidencia II; Estudios terapéuticos – investigación de resultados de tratamiento***.

Descriptores: *Hidroterapia; Baloncesto; Recuperación de la Función.*

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INTRODUCTION

Rehabilitation training can eliminate the dysfunction caused by injury through targeted exercises in the shortest time. For athletes, the recovery process after training is a process of reshaping the body after being stimulated by training.[1] Relaxation in water is often used in rehabilitation training. Because the static pressure, buoyancy, resistance and thermal conductivity of water are different from those of land sports, the influence of water sports on human physiological functions is different from that of land sports. Relaxation in water is a series of rehabilitation treatment processes to restore the body's activity ability and physiological activities by "immersion in water".[2] Therefore, it is very important to take the elimination of muscle fatigue after competition or training as an important part of training seriously.

The elimination of sports fatigue, physical recovery and reasonable measures of basketball players in the process of high-intensity competition and training are of great significance to the exertion of technical and tactical level, the improvement of sports achievements, the prevention of sports injuries and the extension of sports life.[3] At present, relaxing in water is a common means for coaches to actively recover in basketball training practice. However, it is not clear in academic circles in what aspects or to what extent relaxing in water can bring benefits to athletes. Therefore, this study takes basketball players of a sports team in a sports college as the experimental object, in order to explore the influence of relaxing in water on the training fatigue recovery of basketball players.

Research objects and methods

Object of study

There are 60 basketball players in the sports team of a sports college.

Research technique

Collecting and sorting out the core journals about basketball players' training and recovery at home and abroad has laid a solid theoretical foundation for this study.

On the day of the experiment, the athletes' morning pulse, biceps muscle dimension and quadriceps muscle dimension were measured. After the measurement, the two groups of athletes received a heavy load basketball training in winter training period. After the training, the experimental group took 15 minutes of relaxation in water as a recovery means, while the control group took a sit-in rest. During the experiment, the subjects were required to keep their original life and rest and avoid participating in other sports and recreational activities.

SPSS 17.0 was used for data analysis, and one-way ANOVA was used for data analysis and comparison.

According to Partridge's method, the pain degree of joint flexion, abduction, adduction, external rotation and internal rotation was evaluated: painless: 0; Mild (pain or local heaviness): 1; Moderate (tolerable moderate pain, relieved by oneself after activities): 2; Severe (severe pain, activity can not be alleviated): 3; Very serious (pain is very serious, joint activity is limited): 4; Severe (pain is severe, joints can't move at all): 5. Before and after functional exercise, the patients in the two groups were evaluated by special personnel. All data are expressed in (x ±s), and t test is adopted.

RESULT

Comparison of immediate blood lactic acid between experimental group and control group

There is no significant difference in blood HL value between the experimental group and the control group before and after the 800m-meter relaxation swim (p > 0.05). After the experiment, the blood HL of the experimental group and the control group increased, and there was a significant difference before and after the experiment (P<0.05). There was no significant difference between the experimental group and the control group (P>0.05). Two times before and after, the blood HL increased and the performance improved, which indicated that the anaerobic metabolism ability of athletes improved. (Table 1)

Comparison of joint function recovery degree before and after exercise

Before treatment, there was no significant difference in Partridge score between the two groups (P < 0.01). After treatment, the improved Partridge score of patients in both groups decreased significantly (P<0.01), and the improvement of the experimental group was significantly better than that of the control group (P<0.01). (Table 2)

Comparison of curative effects between two groups

The physical characteristics of water include buoyancy pressure and resistance during exercise. The buoyancy of water counteracts part of the body's gravity during underwater rehabilitation training, which can relax the muscles of the body, relieve muscle soreness and relieve the oppressive feeling of joints at the same time, which has a very positive effect on the rehabilitation of patients with limb joint muscle injury. Before treatment, there was no significant difference between the two groups (P>0. 01), but the improvement of the experimental group was obviously better than that of the control group (P<0. 01). (Table 3)

Table 1. Comparison of immediate blood lactic acid between experimental group and control group and comparison of immediate blood lactic acid in control group.

Time	Experimental group	Control group	T test
Before the experiment	11.31±0.21	10.75±0.70	0.141<0.05
After the experiment	11.66±0.16	11.37±0.59	0.128<0.05
T test	0.002<0.05	0.001<0.05	

Table 2. Comparison of joint function recovery degree before and after exercise.

Group	Time	Waist	Shoulder	Knee	P
Experimental group	Before the experiment	2.01±0.22	2.17±0.41	1.08±0.26	<0.01
	After the experiment	0.74±0.29	1.08±0.27	0.55±0.18	
Control group	Before the experiment	1.62±0.23	1.87±0.20	0.88±0.16	<0.01
	After the experiment	0.98±0.71	0.93±0.25	0.58±0.07	

Table 3. Comparison of curative effects between two groups.

Group	n	Cure	Effective	Invalid	Total effective rate
Experimental group	30	16	10	4	86.67%
Control group	30	13	9	8	73.33%

DISCUSSION

Basketball competition is characterized by short time but fierce confrontation, so the whole body attention and muscles of athletes are in a state of high tension. The principle of timely recovery in sports training points out that athletes' fatigue in training should be actively eliminated and excessive recovery should be produced through the process of biological adaptation. The experimental results of this study show that there is no significant difference between the recovery effect of relaxation in water and the control group without recovery means. When fatigue occurs, athletes are mainly excited and calm, their self-control ability declines, their actions are slow, their movements are weak, the quality of technical movements is low, their skills are poor, their technical and tactical awareness declines, their cooperation with teammates decreases, their shooting percentage and passing accuracy decrease obviously, their mistakes increase, their obvious wrong technical movements begin to appear, and their confrontation ability and awareness decline. The usual recovery method is mainly the relaxation of muscle tissue in sports system, while the relaxation of nervous system is only completed by athletes' self-regulation, so the recovery is very slow and the recovery effect is poor.

"Relaxation in water" and "no recovery" have different effects on relieving swelling of brachial muscles. Compared with the "no recovery means" group, the "relaxation in water" recovery means has a significant effect on relieving the swelling of the second brachial muscle and the fourth thigh muscle. Adenosine triphosphate and creatine phosphate provide energy for a very short time in human body, and the amount is small, so long-term exercise energy mainly comes from sugar and fat, so muscle glycogen will be decomposed to provide energy for exercise. The temperature is generally controlled at 5°C or 10 ~ 15°C, and the time is generally controlled at 3 ~ 20 minutes, including continuous cold water soaking and intermittent cold water soaking. The research in literature[4] shows that soaking in 6°C cold water for 10 minutes can minimize muscle soreness and pain spread. At the same time, because the pressure and density of water are higher than those of air, it is necessary to overcome greater resistance and pressure to complete breathing when exercising in water, which can increase the strength of respiratory muscles. Water has strong thermal conductivity, and the energy consumption when moving in water is greater than that on land. The lower the water temperature, the greater the energy consumption.[5]

Rehabilitation training in water can effectively reduce muscle contraction load and slow down ground impact. When the water depth is set at waist level, the weight of lower limbs is equivalent to 29% of the weight on land.[6] In the water, the body load is evenly distributed, which reduces the pressure on the joints and muscles of the body during exercise, promotes the elimination of edema and inflammation at the injured part, and relieves pain and numbness. Active and passive exercise in water can promote blood circulation, relax muscles of the whole body, reduce muscle tension, relieve spasm, expand joint range of motion, and improve the balance and coordination ability of patients, so as to improve the exercise ability of patients. Studies have shown that the cold therapy recovery measures in the middle of two trainings can promote the training performance in the hot environment in the second stage, and the competition time will increase by about 6%.[7]

Athletes' mental consciousness is also related to muscle fatigue. The activities of every functional system of human body are controlled by mental consciousness. Good mental consciousness during exercise can fully arouse the excitability of muscle functional activities and delay the influence of muscle fatigue on the body. Studies have shown that alternate cold and hot therapy can accelerate the clearance of creatine kinase, reduce sympathetic nerve activity, improve the nerve function of peripheral nervous system, and improve the clearance of lactic.[8] The recovery training of different joints can be carried out in different water depths, and special imitation exercises can be carried out in water, which can keep the sports qualities related to special sports and restore athletes' sports ability without aggravating injuries. Patients can carry out training in all directions and with the participation of multiple muscle groups, so that patients can obtain exercise ability close to normal level. Periodic exercise makes relaxation alternately with rhythm. In the past, joint muscles will become soft and elastic.

During the practice of water rehabilitation exercises, the body is stimulated by limb movement and water flow, which stimulates the excitability of the central nervous system through afferent nerves and improves the regulating function of cerebral cortex and neurohumoral.[9] Underwater rehabilitation training is carried out in three-dimensional space. On the one hand, it can buffer and protect injured joints, stimulate and exercise from various angles, which can not only help athletes recover from injuries, but also effectively prevent injuries. The buoyancy and resistance of water can ensure the completion degree of special movement stability, which is beneficial to improve the control of nerve on muscle and movement stability, and make the motor function recover and maintain well. Deep-water running and step running in water are effective means to recover athletes' cardiopulmonary function, which can promote the recovery of athletes' cardiovascular system function.

Suggestion

In competitive sports, joint injury is a very common sports injury. If reasonable functional exercise can be carried out during the recovery period, the injured joint can be recovered quickly. The decrease of muscle fatigue resistance can shorten the training time of patients and affect the rehabilitation effect. The temperature of water can soften the scab skin and help remove necrotic tissue from the wound. After rehabilitation, burn patients are prone to scar contracture, which leads to limited joint movement and affects exercise ability. For the face or a single joint, local cold therapy is often used, such as cold stimulation or ice compress at specific parts; For large areas, such as under thighs, ilium, or clavicle, the whole body is often soaked.

The purpose of basketball players' sports is to improve their sports performance, and their muscle contraction ability and reaction speed directly affect their performance. Therefore, in order to improve the performance of basketball players, attention must be paid to their muscle fatigue. Coaches should educate athletes to establish a sense of self-supervision. They can check their training diaries, find out the problems in athletes' physical reactions in time, ensure that athletes have enough rest time and pay attention to the combination of work and rest. The method of relaxing in water is simple and low-cost, which is the most economical, effective, simple and practical way to recover basketball players from fatigue injury. It is recommended to use it for a long time.

Coaches should deal with all kinds of emergency measures and preparations for athletes' sports fatigue and injury, and should have rich physiological knowledge of sports fatigue and ensure to provide corresponding scientific treatment measures when necessary. No matter what recovery method, the key is the early observation and prediction of coaches and athletes' self-feeling, striving for early prevention, early detection and rational use of various scientific recovery means.

CONCLUSION

As a means of rehabilitation training, water relaxation has been widely used in the field of basketball players' fatigue recovery. At present, the development of contemporary water relaxation is characterized by its combination with exercise therapy. In the future, it will be widely popularized by standardizing the design of scientific and simple training movements.

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