CHINESE MEDICINAL BATH ON ATHLETES' SPORT MUSCLE FATIGUE

EFEITOS DO BANHO MEDICINAL CHINÊS NA FADIGA MUSCULAR ESPORTIVA DOS ATLETAS

EFECTOS DEL BAÑO MEDICINAL CHINO EN LA FATIGA MUSCULAR DEPORTIVA DE LOS ATLETAS

Original Article
Artigo Original
Artículo Original

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ABSTRACT

Introduction: The Fifth International Conference on Sports Biochemistry defines sports fatigue as the physiological process of dysfunction at a certain level or inability to maintain predetermined exercise intensity. When left untreated, it can cause adverse effects to the musculoskeletal system. Natural alternatives for controlling sports fatigue exist in Chinese culture, but scientific research is needed to determine the effectiveness of these treatments. Objective: This study aimed to verify the effect of traditional Chinese medicinal baths on athletes' muscle fatigue. Methods: 100 athletes with exercise-induced muscle fatigue were randomly divided into two groups. The control group received ganglioside injection combined with therapeutic exercise protocols, while the experimental group received the medicinal bath based on traditional Chinese medicine. Tonus of adductors, ischiotibials, gastrocnemius, in addition to lower limb motor function, was evaluated. Results: The total effective rate (90.8%) of the observation group was higher than that of the control group (72.3%), and the difference was statistically significant (P<0.05). After treatment, adductor, hamstring, and gastrocnemius muscle tension in the observation group were lower than the control group (P<0.05). Gross motor function assessment score (GMFM-88), Berg Balance Scale (BBS), 10m walking speed on a 20cm wide walkway (MWS) in the observation group were higher than those in the control group (P<0.05). Conclusion: Chinese herbal lavender lotion combined with suspension exercise can effectively improve the body's muscle strength after exercises, accelerate the recovery of muscle strength, and significantly reduce exercise-induced muscle fatigue. ***Evidence Level II; Therapeutic Studies - Investigating the result.***

Keywords: Baths; Exercise; Athletes.

RESUMO

Introdução: A Quinta Conferência Internacional de Bioquímica Esportiva, define a fadiga esportiva como o processo fisiológico de disfunção em um determinado nível ou incapacidade de manter uma intensidade de exercício predeterminada. Quando não tratada, pode causar efeitos adversos ao sistema musculoesquelético. Há alternativas naturais para o controle da fadiga esportiva na cultura chinesa, mas pesquisas científicas são necessárias afim de descobrir a real efetividade desses tratamentos. Objetivo: Verificar o efeito do banho medicinal tradicional da medicina chinesa na fadiga muscular de atletas. Métodos: 100 atletas com fadiga muscular induzida por exercícios foram aleatoriamente divididos em dois grupos. O grupo controle recebeu injeção de gangliosideo combinada com protocolos de exercícios terapêuticos enquanto o grupo experimental recebeu o banho medicinal baseado na medicina tradicional chinesa. Foi avaliado o tônus de adutores, isquiotibiais, gastrocnêmios além da função motora dos membros inferiores. Resultados: A taxa efetiva total (90,8%) do grupo de observação foi superior à do grupo controle (72,3%) e a diferença foi estatisticamente significante (P<0,05). Após o tratamento, a tensão muscular adutores, jarrete e gastrocnêmio no grupo de observação foi menor que o grupo controle (P<0,05). O escore bruto de avaliação da função motora (GMFM-88), escore de escala de balanço de Berg (BBS), velocidade de caminhada de 10m em uma passarela de 20cm de largura (MWS) no grupo de observação foram maiores do que os do grupo controle (P<0,05). Conclusão: A loção de lavanda de ervas chinesas combinada com o exercício de suspensão pode melhorar efetivamente a força muscular do corpo após os exercícios, acelerar a recuperação da força muscular e reduzir significativamente a fadiga muscular induzida pelo exercício. ***Nível de evidência II; Estudos Terapêuticos - Investigação de Resultados.***

Descritores: *Banhos; Exercício; Atletas.*

RESUMEN

Introducción: La Quinta Conferencia Internacional de Bioquímica del Deporte, define la fatiga deportiva como el proceso fisiológico de disfunción a un determinado nivel o incapacidad para mantener una intensidad de ejercicio predeterminada. Si no se trata, puede causar efectos adversos en el sistema musculoesquelético. Existen alternativas naturales para el control de la fatiga deportiva en la cultura china, pero se necesita una investigación científica para descubrir la eficacia real de estos tratamientos. Objetivo: Verificar el efecto del baño medicinal tradicional de la medicina china sobre la fatiga muscular de los atletas. Métodos: 100 atletas con fatiga muscular inducida por el ejercicio fueron divididos aleatoriamente en dos grupos. El grupo de control recibió una inyección de gangliósidos combinada con protocolos de ejercicio terapéutico, mientras que el grupo experimental recibió el baño medicinal basado en la medicina tradicional china. Se evaluó el tono de los aductores, los isquiotibiales y los gastrocnemios,

además de la función motora de los miembros inferiores. Resultados: La tasa efectiva total (90,8%) del grupo de observación fue superior a la del grupo de control (72,3%) y la diferencia fue estadísticamente significativa (P<0,05). Tras el tratamiento, la tensión de los músculos aductores, jarretes y gastrocnemios en el grupo de observación fue inferior a la del grupo de control (P<0,05). La puntuación de la evaluación de la función motora gruesa (GMFM-88), la puntuación de la Escala de Equilibrio de Berg (BBS) y la velocidad de marcha de 10 m en una pasarela de 20 cm de ancho (MWS) en el grupo de observación fueron mayores que las del grupo de control (P<0,05). Conclusión: La loción de hierbas chinas de lavanda combinada con el ejercicio de suspensión puede mejorar eficazmente la fuerza muscular del cuerpo después de los ejercicios, acelerar la recuperación de la fuerza muscular y reducir significativamente la fatiga muscular inducida por el ejercicio. ***Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.***

Descriptores: *Baños; Ejercicio; Atletas.*

DOI: http://dx.doi.org/10.1590/1517-8692202228052022_0035 Article received on 01/28/2022 accepted on 02/11/2022

INTRODUCTION

Through oral administration of traditional Chinese medicine preparations, there are many studies on eliminating exercise fatigue, the curative effect is also more precise, however, oral preparations have to undergo processes such as disintegration, absorption, and distribution in the body, the effect is relatively slow, and it is easy to be missed, the blood drug concentration cannot be maintained constant; Chinese medicine contains complex ingredients, it does not rule out side effects on body tissues and organs.[1] Although exercise fatigue is a non-pathological symptom, but if it can't be dealt with actively and effectively, will cause serious adverse effects on the body, cause many diseases to occur. The Fifth International Conference on Sports Biochemistry, define sports fatigue as: "The body's physiological process cannot maintain its function at a certain level or cannot maintain a predetermined exercise intensity".[2] In recent years, the sports, military and aerospace fields, attention and research on sports fatigue are gradually deepening, how to quickly eliminate fatigue has been a hot research topic at home and abroad. Traditional Chinese medicine has no toxic side effects in relieving exercise fatigue, and the target is diversified, and its characteristics are increasingly prominent.[3] More and more evidence shows that, prolonged sleep can improve performance, pain sensitivity and GH/IGF-I synthesis response, this may help speed up recovery from muscle damage.[4] Purpose: The author described the importance of sleep for the recovery/prevention of muscle damage caused by exercise, and to the currently available scientific evidence, the transferability in this field provides a point of view.[5] Based on this, through the research of traditional Chinese medicine bath combined with ganglioside and suspension exercise therapy, discuss the influence of traditional Chinese medicine bath on athletes' exercise-induced muscle fatigue and muscle tension, the results are reported as follows.[6]

METHOD

General information

Select a university affiliated hospital from February 2019 to February 2021, 100 cases of exercise-induced muscle fatigue of the admitted athletes, divided into the control group and the observation group according to the random number table method, 50 cases in each group. There were 35 males and 15 females in the control group; There were 32 males and 28 females in the observation group; There was no statistically significant difference in general information between the two groups of athletes (P>0.05).

Inclusion criteria

Persistent central movement disorder; Abnormal development of reflex; Abnormal development of movement and posture; Abnormal muscle tone and muscle strength; Can understand instructions and establish walking function; Can insist on cooperating with treatment for 3 months.[7]

Exclusion criteria

People with epilepsy and abnormal behavior; Those with severe visual impairment; Those with severe organic diseases such as joints and muscles; People with non-motor disorders that affect treatment and assessment; Those who have undergone surgical treatment such as selective posterior rhizotomy and selective peripheral nerve resection; Patients with incomplete clinical data.

Treatment methods

Control group

Give ganglioside injection combined with suspension exercise rehabilitation therapy. 1) Ganglioside intravenous injection, 40mg each time, once a day, continuous medication for 1 month constitutes a course of treatment, a total of 3 courses of treatment. 2) Suspension training is used in conventional rehabilitation treatment, first formulate a training plan based on the weak chain test results, including joint activities, relaxation training, core strength training, correct pelvic tilt, scoliosis, sensory motor control training, walking control training. The above series of actions are 10 times/group, do 3 groups in a row, and you can rest for 25s between groups, training 1 time a day, 5 days a week, 1 month is a course of treatment, a total of 3 courses of treatment.[8]

Observation group

On the basis of the treatment of the control group, Chinese medicine bath was added. Medicinal bath prescription: 15g each of angelica, safflower, glutinous grass, mulberry sticks, dipsacus, Pueraria lobata, papaya, achyranthes bidentata, and cassia twig 5g. The above drugs are soaked in cold water for 20 minutes, decoction into 2L liquid medicine (reserve the medicine residue). During the medicated bath, the athlete's limbs are fully immersed in the liquid medicine for 20 minutes (the temperature of the liquid medicine is maintained at the comfort level of the athlete), once a day, 5 days a week, 1 month is a course of treatment, a total of 3 courses of treatment.

Observation indicators

• Comparison of clinical efficacy. Significantly effective: Muscle tension returns to normal, basic recovery of motor function and cognitive function; Effective: Basically restore muscle tone, improve motor function and cognitive function; Invalid: Muscle tone, motor function, and cognitive function were not improved. Total effective rate = (number of markedly effective cases + number of effective cases) / total number of cases × 100%.

• Comparison of muscle tension: Before and after treatment, the athletes' lower limbs (adductors, hamstrings, gastrocnemius) were evaluated according to the modified Ashworth method. 0 points: No increase in

muscle tone; 1 point: The muscle tension is slightly increased, when the affected part is passively flexed and extended, suddenly jam at the end of joint activity, and then show minimal resistance or release; 2 points: Slight increase in muscle tone, when manifested as passive flexion and extension, suddenly stuck within 50% of the joint range of motion inspection, then all show the least resistance; 3 points: Muscle tension is significantly increased, muscle tension increases significantly when passing through most of the joint range of motion, but the affected part can still be moved easily; 4 points: Severe increase in muscle tone, difficulty in passive movement; 5 points: Stiffness, the affected part is in a state of stiffness when passively flexing and extending, can't move. • Motion function situation: According to the Gross Motor Function Assessment Scale (GMFM-88). 88 athletes in GMFM-88, each item is scored according to 0~3 points, the higher the score, the better the motor function; The Berg Balance Scale Score (BBS) contains 14 items, and each item is scored from 0 to 4 points, the higher the score, the better the motor function; The faster the 10m walking speed (MWS) of the 20cm wide trail, the better the exercise function.[9]

Statistical methods

Use SPSS17.0 statistical software to process the data. Count data is expressed in [example (%)], using x2 test; The measurement data are expressed as mean±standard deviation (x±s), using one-way analysis of variance. P<0.05 indicates that the difference is statistically significant.

RESULTS

Clinical efficacy comparison treatment group, the total effective rate is higher than the control group (x2=7.359, P=0.007<0.05). (Figure 1)

Muscle tension comparison After treatment, the muscle tension (adductors, hamstrings, gastrocnemius) of the two groups of athletes was reduced (P<0.05); The observation group was lower than the control group (P<0.05). (Figure 2)

After the motor function comparison treatment, the GMFM-88 score, BBS score and MWS of the two groups of athletes improved (P<0.05); The observation group was higher than the control group (P<0.05). (Figure 3 and 4)

DISCUSSION

In summary, chinese medicine to relieve exercise fatigue has become a research hotspot, it is found that many Chinese medicines and active ingredients have the effect of eliminating exercise fatigue. The treatment principle of anti-sport fatigue with traditional Chinese medicine is beneficial to the kidney and nourishing yin, tonifying the spleen and replenishing qi, as well as the method of regulating the liver and regulating qi and promoting blood circulation and diuresis. The researcher, under the guidance of modern Chinese medicine theory, the use of traditional

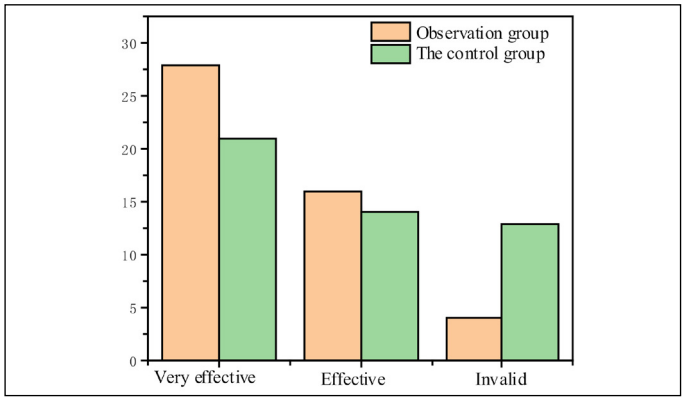

Figure 1. Comparison of the clinical efficacy of sports muscle fatigue between the two groups of athletes.

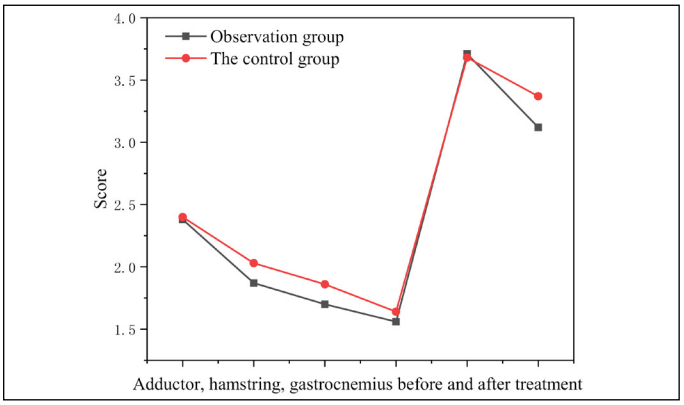

Figure 2. Comparison of muscle tension scores between the two groups of athletes before and after the treatment of exercise-induced muscle fatigue (min, ± s).

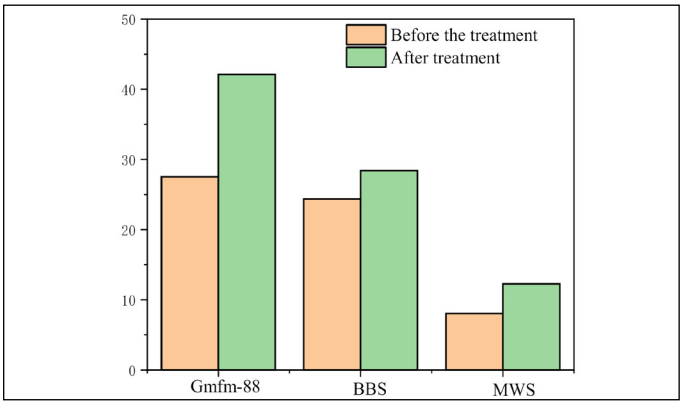

Figure 3. Comparison of sports function of the two groups of athletes before and after the treatment of sports muscle fatigue (observation group).

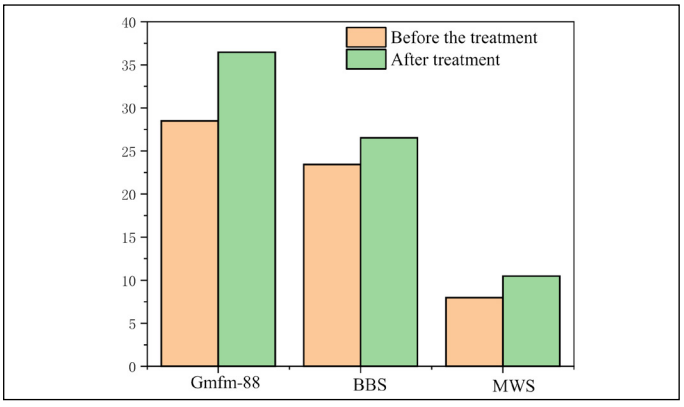

Figure 4. Comparison of sports function of the two groups of athletes before and after the treatment of sports muscle fatigue (control group).

Chinese medicine to treat sports fatigue is mostly from the loss of qi, blood and body fluid and the imbalance of yin and yang, start with a loss of viscera. Modern medicine uses traditional Chinese medicine to resist exercise fatigue, from regulating the metabolism of energy substances and improving the body's antioxidant capacity, as well as the elimination of free radicals and other aspects to regulate body fatigue. In the clinical application of TCM principles and prescriptions, reasonable compatibility and application of traditional Chinese medicine can relieve fatigue caused by human exercises, so as to reduce its adverse effects on the human body.[10] Therefore, grasping the root of sports fatigue, under the guidance of the classic theory of traditional Chinese medicine, syndrome differentiation and treatment, choosing drugs to eliminate and relieve exercise fatigue is of great significance. Because of the characteristics of high water temperature and high water pressure, traditional Chinese medicine baths, can increase the skin permeability of athletes, promote the absorption of

pharmaceutical ingredients; Dilate blood vessels, increase blood flow, and strengthen metabolism; The drug enters the blood circulation through the skin, avoid gastrointestinal and liver adverse reactions caused by oral drugs, it can also reduce muscle tone. Chinese angelica, safflower and Sichuan Achyranthes bidentata in the medicated bathing prescription reduces swelling and pain, promote blood circulation and remove blood stasis; Stretching sinew grass, Sichuan Dipsacus, Duhuo dredging the meridians and collaterals, dispelling wind and dampness; Mulberry sticks, kudzu root, papaya, cassia sticks warm the meridians and dispel cold, dispel wind and relieve spasm. The results of this study show that, the total effective rate of treatment in the observation group was higher than that in the control group (P<0.05), muscle tension was lower than the control group (P<0.05), and the GMFM-88 score, Berg balance scale score, and MWS were higher than the control group (P<0.05).

CONCLUSION

The PT parameter of the peak torque of the flexors and extensors, it directly reflects its maximum weight-bearing muscle strength, the relative muscle strength PT/BW removes the weight difference factor, more objectively reflect the muscle strength of the tested person per kilogram of body weight, both are the most sensitive and specific indicators in the evaluation of lower limb muscle strength. The above results show: The traditional Chinese medicine fumigation lotion can effectively improve the muscle strength of the exercise body after exercise, speeds up the recovery of muscle strength and has a significant effect on eliminating exercise-induced muscle fatigue.

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

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. LL: writing and performing surgeries; Hui Li: data analysis and performing surgeries. ZZ: article review and intellectual concept of the article.

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