EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING ON THE ANAEROBIC CAPACITY OF WRESTLERS

EFEITOS DO TREINAMENTO INTERVALADO DE ALTA INTENSIDADE SOBRE A CAPACIDADE ANAERÓBICA DOS LUTADORES

EFECTOS DEL ENTRENAMIENTO POR INTERVALOS DE ALTA INTENSIDAD EN LA CAPACIDAD ANAERÓBICA DE LOS LUCHADORES

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Huan Liu[1]
(Physical Education Professional)
Yuxing Li[2]
(Physical Education Professional)

1. Shantou University Medical College, Shantou, Guangdong, China.
2. Guangzhou Sport university, School of Physical Education, Guangzhou, Guangdong, China.

Correspondence:
Yuxing Li
Guangzhou, Guangdong, China.
510000, lyuxing1976@126.com

ABSTRACT

Introduction: Since the Wingate anaerobic experiment was proposed in the 1970s, it has come to be used as an important detection method to evaluate athletes' high-power sport capacity, the effect of training, and the training method. Therefore, it is often used to measure and evaluate the anaerobic work capacity of the human body. Objective: Analyze the effects of high-intensity interval training on the anaerobic capacity of male wrestlers. Methods: Professional wrestlers from a sports college were selected, as well as 30 college students majoring in physical education at a sports college, to compare the anaerobic power test. Results: When evaluated by the Wingate anaerobic experiment, the value level of anaerobic power of training effects is best reflected in the first 10 s of the wrestling anaerobic experiment. The 30 s Wingate mainly reflects the effect of wrestling training on human anaerobic power, but the evaluation of anaerobic capacity from this period was not evidenced. Conclusion: The Wingate anaerobic experiment is an important method for evaluating the level of wrestling training and can be used as a basis for evaluating the effect of training and the level of wrestling. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: High-Intensity Interval Training; Exercise; Endurance Training.

RESUMO

Introdução: Desde que o experimento anaeróbico Wingate foi proposto nos anos 70, ele passou a ser utilizado como um importante método de detecção para avaliar a capacidade esportiva de alta potência dos atletas, o efeito do treinamento e o método de treinamento. Com isso, ele é frequentemente usado para medir e avaliar a capacidade de trabalho anaeróbico do corpo humano. Objetivo: Analisar os efeitos do treinamento intervalado de alta intensidade sobre a capacidade anaeróbica dos lutadores livres masculinos. Métodos: Foram selecionados lutadores profissionais de uma faculdade de esportes, além de 30 estudantes universitários graduados em educação física em uma faculdade de esportes para comparar o teste de potência anaeróbica. Resultados: Quando avaliado pelo experimento anaeróbico Wingate, o nível de valor da potência anaeróbica dos efeitos do treinamento é melhor refletido nos primeiros 10 segundos de luta livre do experimento anaeróbico. O Wingate de 30 segundos reflete principalmente o efeito do treinamento de luta livre na potência anaeróbica humana, mas a avaliação da capacidade anaeróbica desde período não foi evidenciada. Conclusão: O experimento anaeróbico Wingate é um método importante para avaliar o nível de treinamento da luta livre, podendo ser utilizado como base para avaliar o efeito do treinamento e o nível da luta livre. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Treinamento Intervalado de Alta Intensidade; Exercício Físico; Treino Aeróbico.*

RESUMEN

Introducción: Desde que se propuso el experimento anaeróbico de Wingate en los años 70, comenzó a utilizarse como un importante método de detección para evaluar la capacidad deportiva de alta potencia de los atletas, el efecto del entrenamiento y el método de entrenamiento. Por ello, se utiliza con frecuencia para medir y evaluar la capacidad de trabajo anaeróbico del cuerpo humano. Objetivo: Analizar los efectos del entrenamiento interválico de alta intensidad sobre la capacidad anaeróbica de los luchadores masculinos. Métodos: Se seleccionaron luchadores profesionales de una escuela de deportes, además de 30 estudiantes universitarios graduados en educación física en una escuela de deportes para comparar la prueba de potencia anaeróbica. Resultados: Cuando se evalúa mediante el experimento anaeróbico de Wingate, el nivel de valor de la potencia anaeróbica de los efectos del entrenamiento se refleja mejor en los primeros 10 segundos del experimento anaeróbico de lucha. El Wingate de 30 segundos refleja principalmente el efecto del entrenamiento de lucha en la potencia anaeróbica humana, pero no se evidenció la evaluación de la capacidad anaeróbica a partir de este periodo. Conclusión: El experimento anaeróbico de Wingate es un método importante para evaluar el nivel de entrenamiento de lucha, y puede utilizarse como base para evaluar el efecto del entrenamiento y el nivel de lucha. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Entrenamiento de Intervalos de Alta Intensidad; Ejercicio Físico, Entrenamiento Aeróbico.*

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INTRODUCTION

As an Olympic sport, wrestling is a two-person confrontation sport that requires extremely high explosive power of the human body. Strength can play a big role in wrestling, there is a saying in boxing proverbs that "one force can conquer ten guilds", strength is the foundation of all techniques, the power of wrestling is mainly explosive, athletes are required to, during the game, according to the situation on the field, fast movement uses a variety of techniques to gain the edge of the game.[1] As an important means of athlete training, high-intensity interval training mode has the characteristics of short-term and high-efficiency, and is valued by more and more industry experts and coaches. In major professional sports teams and fitness and weight loss clubs, the high-intensity interval training mode is widely used, due to the good results achieved in training efficiency, competitive ability improvement and sports life extension, therefore, the high-intensity interval training mode has become a hot spot in the theory and practice of the current world sports training field.[2] The author's advice to professional athletes engaged in wrestling training, and the anaerobic power of non-wrestling sports college students, a comparative study was carried out, the change law of anaerobic power in wrestling training under load conditions is discussed, and the method and reference for scientific sports training evaluation and monitoring are provided.[3]

METHOD

Research objects

The experimental group was a professional wrestler from a sports college of a sports college, and the control group was a college student majoring in physical education in a college of physical education.[4] The subjects were male with normal physical examination, as shown in Table 1.

Anaerobic power test

The anaerobic power test was carried out on a Swedish-made Monark894E bicycle with a load of 0. 75 kg/kg (body weight)

1. After the athlete arrives at the test site, the tester shall explain the purpose, requirements and precautions of the test to the athlete, then start a warm-up, including 5 minutes of general dynamic stretching and 3-5 minutes of adaptive warm-up on the power bike, do 2-3 sprints in between to get your heart rate up to 150 beats/min.[5]
2. 3 professional testers strictly follow the instrument procedures. First, adjust the seat height of the power bicycle, fasten the pedals, and adjust to the most comfortable state for athletes, then, set the resistance coefficient according to the athlete's weight, and set the load to 8.5% WT, and explain the precautions to the athlete again.
3. The formal test starts at about 10:30 in the morning, first, let the athlete complete a 5s fast ride on an unloaded power bike, max out the speed, then the tester hits the start button, at the same time, another staff member presses the button for loading the load, so that the athlete can fully measure the full power output for 30 seconds.[6] In order to ensure the quality of the test, the trainer supervises on the side to encourage the subjects to do their best.

There is no need for a code of ethics for this type of study.

RESULTS

Within-group comparisons show that, there were significant differences in PP, PP/kg, AP, AP/kg, PD (%) and Rpm between the experimental group and the control group after the experiment (P<0.05);[7] There was no significant difference in PD (w/skg-1), t-PP (s) and BW (kg) between the experimental group and the control group after the experiment (p>0.05). Comparisons between groups show that, there was no significant difference in PP, AP, AP/kg, PD (w/s kg-1), t-PP (s), BW (kg) and Rpm between the experimental group and the control group after the experiment (p>0.05).); The PD (%) of the control group was lower than that of the experimental group, but there was no significant difference (p>0.05);[8] Compared with the control group, the PPkg of the experimental group was greatly improved, and there was a significant difference between the groups (P<0.05). As shown in Figure 1.

The Wingate anaerobic experiment has been studied for many years, it is believed that the Wingate anaerobic experiment is an ideal experiment reflecting the anaerobic working ability, there is a close correlation between the average output power and the sports performance of speed sports.[9] But some studies show that, the Wingate anaerobic experiment could not make the blood lactate reach the highest value, the changes of ATP-CP, glycogen and lactate before and after exercise were obvious, however, if it did not reach the maximum value, it was considered that strenuous exercise for 30s was not enough to measure anaerobic work capacity. Therefore, when evaluating the anaerobic working ability through the 30s Wingate anaerobic experiment, it is more representative in reflecting anaerobic power, but not completely accurate in reflecting anaerobic capacity.[10] It is generally believed that in the Wingate anaerobic experiment, PP reflects the ability of limb muscles

Table 1. List of basic information of subjects.

	age	height/cm	weight/kg	wrestling training
wrestling training group	20±0.9	173.2±4.7	67.5±7.2	3
Sports Student Group	20±0.7	176.2±5.1	65.9±5.9	

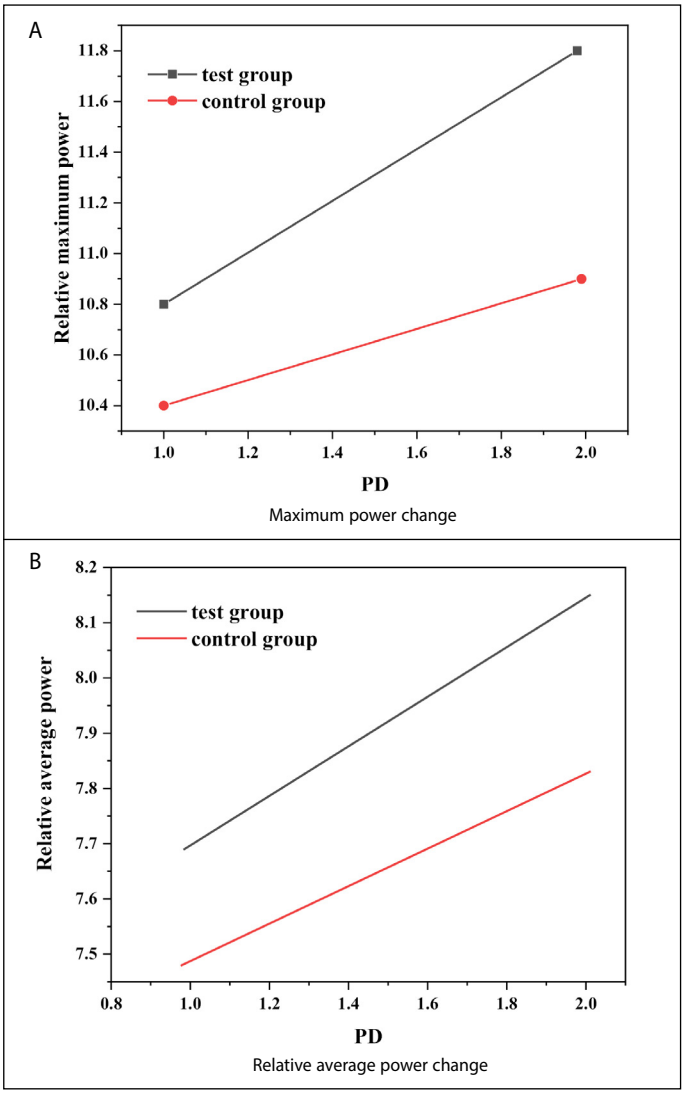

Figure 1. Changes of relative maximum power and relative average power before and after the experiment in CG group and TG group.

to generate high mechanical power in a short period of time, it can be used to evaluate the energy supply capacity of the original phosphate; AP reflects the endurance of muscles to maintain high power, which can be used to evaluate the energy supply capacity of the glycolytic system; PD stands for Anaerobic Endurance Level. Research has shown that, to measure the anaerobic working capacity with the Wingate anaerobic experiment, the measurement time should be extended, and the measurement time of 40s or 60s can be taken, as shown in Table 2, from the comparison of the anaerobic power results of the two groups, it can be seen that the absolute values of PP and AP in the wrestling training group are higher than those in the sports student group, the difference was highly significant ($P<0.01$), and the difference between the two groups was significant at the MP level ($P<0.05$), it shows that the systematic wrestling training can improve the anaerobic work ability of the human body. In terms of relative values, the levels of PP and AP in the wrestling training group were higher than those in the sports student group, and the difference in PP level was highly significant ($P<0.01$), and the difference in AP level was significant ($P<0.05$), however, there was no significant difference between the two groups in MP level ($P> 0.05$). It shows that when evaluating the anaerobic power ability of wrestlers by the Wingale anaerobic test method, the difference in body weight must be considered, and the relative value of PP, AP and MP should be used to evaluate the wrestlers objectively. At the same time, the Wingate experiment for measuring 30s is described, it does not fully indicate the anaerobic endurance capacity of the human body.

DISCUSSION

Aerobic capacity refers to the body's ability to work for a long time when the oxygen supply is relatively sufficient. The improvement of athlete's aerobic endurance level is after long-term systematic training, consequences of body adaptation to exercise training. In terms of training, endurance refers to the ability of an organism to maintain a specific intensity load or quality of movement over an extended period of time. Substance metabolism and energy metabolism are the basis for the functional activities of various tissues and organs in the body, sports ability is the concentrated expression of various functional activities of the body. According to the different ways of energy supply, exercise ability can be divided into aerobic exercise ability and anaerobic exercise ability, due to the high level of aerobic metabolism, it can quickly eliminate the lactic acid accumulated during the anaerobic process and effectively improve the glycogen reserve in the muscles, therefore, the aerobic energy supply capacity of the human body is the basis of the anaerobic energy supply capacity, and a high level of anaerobic capacity should be based on a high level of aerobic capacity. The improvement of human endurance, it is always accompanied by an improvement in the function of the cardiovascular system, as well as an increase in aerobic capacity. The essence of athlete's training is the process of accepting a kind of exercise load stimulation, which causes the adaptive change of the sports subject. It is directly reflected in the body to accelerate the metabolism in the body, promote the synthesis and accumulation of substances in the body, and further improve the body function, so as to achieve the effect of enhancing physical fitness and athletic ability. The magnitude of the load stimulus is extremely important for athletes, excessive load can easily lead to aversion to training and overtraining in athletes, while smaller loads cannot maximize training benefits. Therefore, it is particularly important to apply a reasonable load to stimulate the athlete.

Table 2. List of anaerobic power comparison.

	wrestling training group	Sports Student Group	unit
PP	654.11±68.45	514.72±57.13	W
PP	9.45±1.57	8.42±0.47	W/kg
AP	471.05±37.41	427.14±43.54	W
AP	6.24±0.57	6.42±0.16	W/kg
MP	342.14±43.21	314.38±37.62	W
MP	4.89±0.17	4.82±0.67	W/kg

CONCLUSION

Traditional high-intensity interval training (CG) can significantly improve the maximum anaerobic power of freestyle wrestlers, and the relative maximum anaerobic power (mainly powered by the phosphate system); Special movement mode high-intensity interval training (TG), it can significantly improve the specific endurance of freestyle wrestlers (the glycolytic system is the main energy supply). Special action mode high-intensity interval training (TG) is better than traditional high-intensity interval training (CG), can better improve lactate tolerance in freestyle wrestlers; High-intensity interval training with two action modes can improve the clearance rate of blood lactate in the 3-10min stage after training, post-training blood lactate clearance may not be related to exercise patterns during training. Special load stimulation of the same cycle, wrestlers who have undergone high-intensity interval training (TG) in a special movement mode, more adaptive wrestlers than traditional high-intensity interval training (CG) wrestlers. When evaluating the anaerobic ability of freestyle wrestling, the anaerobic power test is combined with the anaerobic special quality and blood lactate test, the specific energy metabolism level can be more accurately evaluated.

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

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. HL: writing and data analysis; YL: article review and intellectual concept of the article.

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