EFFECT OF AEROBIC EXERCISE ON METABOLISM AND PHYSICAL HEALTH OF OBESE FEMALE COLLEGE STUDENTS

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EFEITO DO EXERCÍCIO AERÓBICO SOBRE O METABOLISMO E A SAÚDE FÍSICA DAS ESTUDANTES UNIVERSITÁRIAS OBESAS

EFECTO DEL EJERCICIO AERÓBICO EN EL METABOLISMO Y LA SALUD FÍSICA DE ESTUDIANTES UNIVERSITARIAS OBESAS

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ABSTRACT

Objective: To explore the effects of aerobic exercise on the metabolism and physical health of obese college students. Methods: 219 obese college students of different stages were selected by stratified group sampling according to colleges and grades. The effects on physical indices of obese female college students were analyzed by the two-factor variation method after 32 weeks of aerobic exercise training. Results: The experimental group and the control group were significantly improved, and long-term aerobic prescription training was more effective than special education in changing the physical health of obese female college students. After 32 weeks of extreme weight loss training, in the statistical process of 219 valid data, 188 people were found to have lost weight, with the most significant drop reaching 8 kg; BMI decreased in 193 people, and body fat content decreased in 172 people. After 12 weeks of aerobic exercise, the level of cardiopulmonary function of female college students increased. The aerobic exercise prescription designed by the experiment can improve upper and lower limb strength, body flexibility, abdominal muscle strength, and lung function of female college students, which cannot be achieved by diet control alone. Conclusion: Aerobic exercise prescription is an effective means to improve the effect of cardiopulmonary exercise on female college students, and can stimulate the students' enthusiasm and initiative to exercise independently. ***Level of evidence II; Therapeutic studies - investigation of treatment results***.

Keywords: Exercise; Student Health; Obesity.

RESUMO

Objetivo: Explorar os efeitos do exercício aeróbico sobre o metabolismo e a saúde física das estudantes universitárias obesas. Métodos: 219 estudantes universitárias obesas de diferentes estágios foram selecionadas por amostragem estratificada de grupos de acordo com os colégios e as notas. Os efeitos nos índices físicos de estudantes universitárias obesas foram analisados pelo método de variação de dois fatores após 32 semanas de treinamento com exercícios aeróbicos. Resultados: O grupo experimental e o grupo controle foram significativamente melhorados; o treinamento com prescrição aeróbica a longo prazo foi mais eficaz do que o ensino especial na mudança da saúde física das estudantes universitárias obesas. Após 32 semanas de treinamento de emagrecimento extremo, no processo estatístico de 219 dados válidos, verificou-se que 188 estudantes perderam peso, com a queda mais significativa atingindo 8 kg; o IMC diminuiu em 193 estudantes, e o conteúdo de gordura corporal diminuiu em 172 estudantes. Após 12 semanas de exercícios aeróbicos, o nível da função cardiopulmonar das estudantes universitárias femininas aumentou. A prescrição de exercícios aeróbicos concebida pela experiência pode melhorar a força dos membros superiores e inferiores, a flexibilidade corporal, a força muscular abdominal e a função pulmonar das estudantes universitárias femininas, o que não pode ser alcançado apenas pelo controle de dieta. Conclusão: A prescrição de exercícios aeróbicos é um meio eficaz para melhorar o efeito dos exercícios cardiopulmonares das estudantes universitárias, podendo estimular o entusiasmo e a iniciativa dos estudantes de se exercitarem independentemente. ***Nível de evidência II; Estudos terapêuticos – investigação de resultados de tratamento***.

Descritores: *Exercício Físico; Saúde do Estudante; Obesidade.*

RESUMEN

Objetivo: investigar los efectos del ejercicio aeróbico en el metabolismo y en la salud de las estudiantes universitarias obesas. Métodos: 219 estudiantes universitarias obesas de diferentes grados fueron investigadas por muestreo estratificado por conglomerados. A través de 32 semanas de entrenamiento de prescripción de ejercicio aeróbico y análisis de varianza de dos factores, se estudió el efecto de la prescripción de ejercicio aeróbico en algunos índices físicos de las estudiantes universitarias obesas. Resultados: los resultados del grupo experimental y del grupo control mejoraron significativamente, y el entrenamiento aeróbico a largo plazo fue más eficaz que la enseñanza especial para mejorar la salud física de las estudiantes universitarias obesas. Después de 32 semanas de entrenamiento de

pérdida de peso extrema, en el proceso estadístico de 219 datos válidos, se encontró que 188 personas perdieron peso, la disminución máxima fue de 8 kg; el IMC disminuyó en 193 personas y el contenido de grasa corporal disminuyó en 172 personas. Después de 12 semanas de ejercicio aeróbico, la función cardiopulmonar de las estudiantes universitarias aumentó significativamente. La prescripción de ejercicio aeróbico diseñada puede mejorar la fuerza de las extremidades superiores e inferiores, la flexibilidad del cuerpo, la fuerza de los músculos abdominales y la función pulmonar de las estudiantes universitarias. Conclusión: la prescripción de ejercicio aeróbico es un método eficaz para mejorar el efecto del ejercicio cardiopulmonar de las estudiantes universitarias y puede estimular eficazmente el entusiasmo y la iniciativa de los estudiantes de ejercitarse independientemente. ***Nivel de evidencia II; Estudios terapéuticos – investigación de resultados de tratamiento***.

Descriptores: *Ejercicio Físico; Salud del Estudiante; Obesidad.*

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INTRODUCTION

In recent years, with the rapid development of China's economy and the improvement of people's living standards, the proportion of overweight and obese college students is increasing year by year, and the physical and mental quality of college students in China is declining, among which obese female college students account for a large proportion, and some indicators of physical quality are lower than those of students of the same age in the United States and Japan.[1] The physical condition, psychological, spiritual and health problems of contemporary female college students are quite prominent. How to guide female college students to exercise scientifically, get the best fitness effect and improve their health level in an all-round way is an urgent problem to be solved.[2]

According to the survey, obese students have poor awareness of exercise and lack of planned fitness guidance, and their self-monitoring and inertia of self-exercise are significantly different from those of normal-sized students.[3] Obesity not only affects college students' body shape, but also makes them in a sub-health state. Obesity not only brings great physical and mental pressure, but even some students suffer from psychological diseases. Based on the survey of college students' mental health, this paper carries out aerobic exercise and dietary intervention on obese middle school students, and then makes a research and analysis on their physical and psychological conditions, and makes a concrete summary.

Research objects and methods

Object of study

219 obese female college students of different grades were selected as voluntary subjects and subjects by stratified cluster sampling according to colleges and grades. (BMI is a commonly used index to judge the degree of obesity in the world, and its formula is weight (kg)/ height (m). The BMI criteria put forward by China Working Group on Obesity are: lean below 18.5, normal between 18.5 and 23.9, overweight between 24.0 and 27.9, and obesity above 28.[4] At present, this standard has been widely accepted in China, and this paper also adopts this standard as the analysis basis.

Research technique

Observe the training performance of girls in the experimental group, randomly measure the pulse after exercise, and inquire about self-feeling before and after exercise, so as to adjust the exercise intensity.[5]

Through cnki search tool, the related content is searched by taking exercise to lose weight as the key word. To understand the current research methods and concepts related to exercise weight loss, and provide reference for the research of this subject.[6]

The exercise program is divided into two stages. The targeted exercise prescription is formulated according to the principle of gradual and differential treatment. The exercise heart rate is (220- physiological age) × (60% ~ 80%). The pulse is measured for 10 seconds before, during and after each exercise to control the exercise intensity. The exercise time is 115 ~ 2 hours every afternoon. Exercise prescription lasts for 32 weeks. Choose running, kicking shuttlecock, climbing stairs, skipping rope, etc., taking the principle of not feeling excessive fatigue and keeping exercising every day as a step by step.[7]

Reasonable diet: low-calorie balanced diet, food selection should pay attention to nutrients, low-calorie foods; Reduce high-fat and high-starch foods. Appropriately increase the intake of vegetables, fruits, bean products and cellulose.

All test data are processed by excel software, invalid data are removed, and valid data are analyzed.

RESULTS

Two-factor variance analysis of physical health test scores between experimental group and control group ($\bar{x} \pm SD$).

It can be seen from Table 1 that there is no difference between the test scores of the experimental group and the normal control group, but the difference between the experimental control group and the normal control group is very significant. It shows that after 1 ~ 16 weeks of training, the overall change of physical health of the experimental group is not significant, suggesting that the original level of physical quality and function of the experimental group is low and needs long-term exercise to improve, while the significant difference of the experimental control group may be related to the special teaching characteristics. The test scores of the experimental group from 17 to 32 weeks are significantly different from those of the experimental control group, and the difference between the experimental control group and the normal control group is also very significant, and the experimental composition is superior to that of the experimental control group. The results of the experimental group and the experimental control group are significantly improved, and long-term aerobic prescription training has more obvious effect on changing the physical health of obese female college students than special teaching.

Changes in physique and body composition

After 32 weeks of extreme slimming training, in the statistical process of 219 valid data, it was found that 188 people lost weight, with the largest drop reaching 8 kg; BMI decreased in 193 people, and body fat content decreased in 172 people, as shown in Table 2.

Table 1. Two-factor variance analysis of physical health test scores between experimental group and control group ($\bar{x} \pm SD$).

Group	Sample (n)	1~16 weeks	17~32 weeks
Experimental group	38	55.32±3.01	75.62±4.21**
Experimental control group	135	57.14±3.47##	60.29±2.71##
Normal control group	46	78.02±7.79	81.26±6.07

Note: * *: P < 0.01, experimental group VS experimental control group; # #: p < 0.01, experimental control group VS normal control group.

Aerobic aerobics improves the cardiopulmonary function of female college students

Lung is the main organ of respiratory system, and it is the place of gas exchange inside and outside human body. The gas exchange capacity of lung is expressed by vital capacity. 800 meters tests the endurance quality of human body. Endurance refers to the ability of human body to exercise muscles for a long time. Female college students who often take part in aerobic exercise can improve the value of vital capacity, enhance the reserve capacity of the lungs, enhance the working ability of respiratory organs and improve the respiratory function of the lungs.

It can be seen from Table 3. After 12 weeks of aerobic exercise, the cardiopulmonary function level of female college students increased obviously, which indicated that regular exercise had a good effect on the physiological functions of cardiovascular system and respiratory system of female college students.

Test of physical fitness level

In the test of physical fitness level, only 5 indexes of 4 experimental groups were selected. The following direct graph clearly shows the changes of 5 indexes between the groups before and after the experiment, especially the numerical changes of the experimental group are more obvious. (Figure 1,2,3,4 and 5)

From Figure 1 to Figure 5, it can be found that the level of some physical indicators of female college students in the experimental group has been significantly improved; Some physical indicators of female college students in the control group have no obvious changes, which shows that the improvement of physical fitness level by a single scientific diet is not obvious; Compared with the experimental group, the control group showed significant differences in the improvement of some physical indexes. It is proved that the aerobic exercise prescription designed by experiment can improve the strength of upper and lower limbs, body flexibility, abdominal muscle strength and lung function of female college

Table 2. Comparison table of body composition changes.

	Weight (kg)	BMI	Body fat content
Decline in numbers	188	193	172
Constant number of people	25	14	33
Rising number	6	12	14

Table 3. Comparison between experimental group and control group after exercise.

	Experimental group		Control group		P value
	N	M±SD	N	M±SD	
Height (cm)	219	159.66±3.24	219	160.84±3.38	N.s
Rest weight (kg)	219	49.63±4.04	219	50.11±3.96	<0.05
Vital capacity (ml)	219	2988.76±352.18	219	2806.75±366.20	<0.05
800 meters (s)	219	223.85±18.24	219	236.90±17.06	<0.05

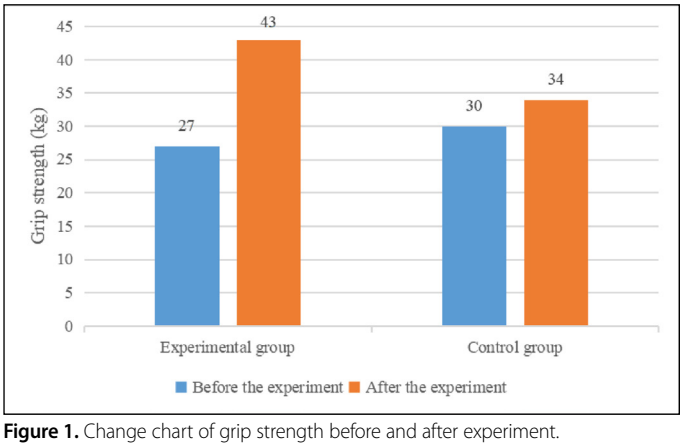

Figure 1. Change chart of grip strength before and after experiment.

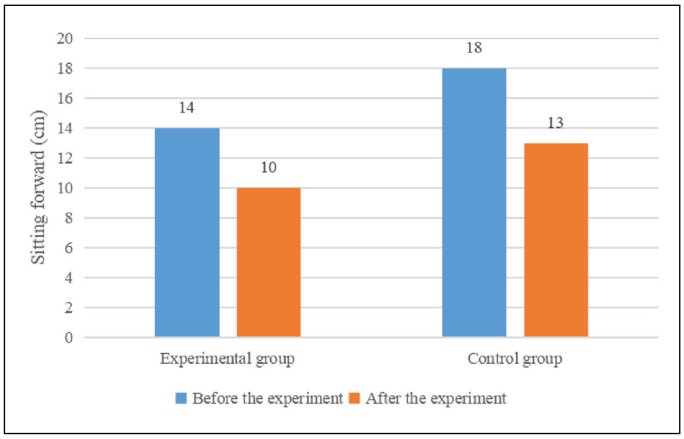

Figure 2. Changes of flexion of sitting body before and after experiment.

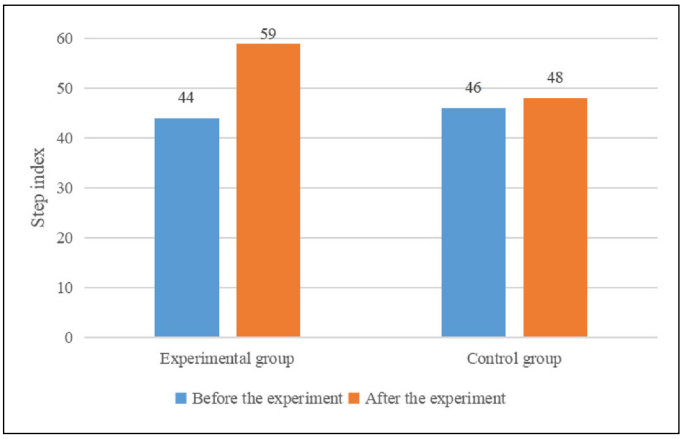

Figure 3. Change diagram of step index before and after experiment.

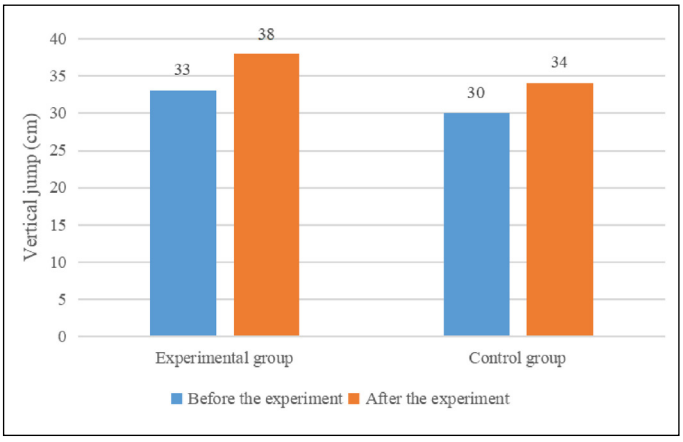

Figure 4. Longitudinal jump diagram before and after experiment Longitudinal jump diagram before and after experiment.

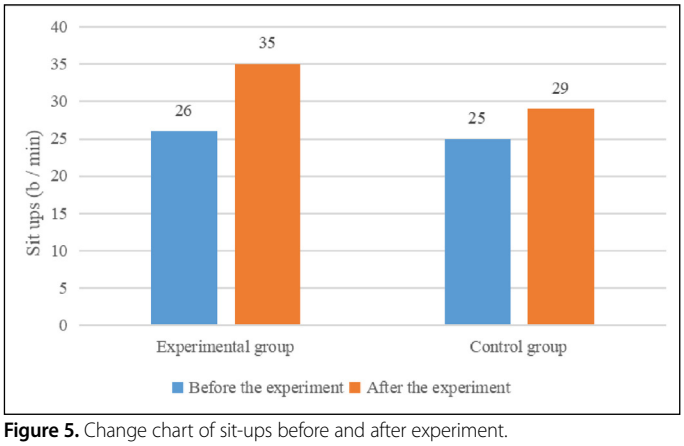

Figure 5. Change chart of sit-ups before and after experiment.

students, which can not be achieved by scientific diet control or simple exercise. It is proved that aerobic exercise prescription combined with scientific diet control can promote the improvement of physical fitness.

DISCUSSION

Generally speaking, the influencing factors of the mental health development of obese middle school students are often in various aspects. To some extent, the function and quality of obese middle school students have a direct impact on their physical and mental health, and weight, as the most important factor, has a serious restrictive effect on the mental health development of college students. The step test index of the experimental group and the experimental control group was not significant at 1 ~ 16 weeks, but very significant at 17 ~ 32 weeks in the experimental group and the experimental control group, which indicated that aerobic prescription training had a better effect on improving the heart function of obese female college students. Sit-ups reflect the strength and burst speed of waist and abdomen muscles. Doing sit-ups can effectively increase the strength of waist and abdomen and consume excess fat in abdomen.

At present, the pathological mechanism of obesity is unclear, and most people think that obesity is the result of multiple factors. A large number of studies have shown that aerobic exercise has a positive therapeutic effect on overweight and obesity, while psychological factors have a certain intervention effect on the formation and treatment of obesity. BMI is an important index to evaluate the composition and nutritional status of human body. The waist/hip circumference ratio is put forward on the basis of studying the fat activity and function in different parts of the body, which can make people know their health more accurately and conveniently. If the waist circumference is obviously increased, suggesting that the body fat is distributed in a central state, the risk of heart disease and diabetes will increase for obese people. From the index and degree of body composition changes in the experimental group and the control group, the main changes are body weight, fat percentage, obesity and fat weight which are closely related to diet, which indicates that scientific diet control can effectively change body composition.

During the implementation of aerobic exercise prescription, the contents of exercise prescription should be adjusted in time. How can the effect of exercise prescription be reflected through the implementation and feedback of experiments. There are significant differences in height standard body mass index between the experimental group and the normal control group, and between the experimental control group and the normal control group from 1 to 16 weeks, which indicates that aerobic prescription training can more pertinently shape the female body. In this study, after the intervention of aerobic exercise and reasonable diet, the heart rate and heart function index decreased, the vital capacity increased, and the step index increased, which indicated that the experimental prescription of aerobic exercise and reasonable diet intervention made by this study had obvious effect on improving human heart and lung function. After the exercise, it was found that all the players improved significantly, and the maximum value was improved for nearly 3 minutes. It seems that aerobic exercise can not only lose weight, but also effectively enhance the physical quality of obese teenagers.

CONCLUSION

In the intervention process of overweight and obese college students, both aerobic exercise and mental health education have not only improved their awareness of scientific weight loss and their ability to adhere to the correct weight loss plan, but also improved their bad psychological emotions in the process of weight loss, strengthened their belief in weight loss and formed good exercise habits. Aerobic fitness prescription is an effective means to improve the effect of College Students' cardiopulmonary exercise. It can effectively stimulate students' enthusiasm and initiative of self exercise and promote their good motivation to actively acquire sports knowledge. If exercise prescription becomes a teaching mode, there are still many areas that need to be improved and developed in the task, teaching objectives, evaluation and evaluation of exercise prescription teaching, the research on exercise prescription in teenagers' physique sensitive period, the application of exercise prescription, the research on exercise prescription for obese children and the optimization of exercise prescription.

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