Original Article

A Study on the Effect of Sports Intervention Based on the Energy Metabolism on Body Composition of Obese College Students

K. W. Dong[1,2], **X. X. Xue**[1]

[1]School of Health Science, Sports Human Science, Wuhan Sports University, Wuhan, China, [2]Physical Education Faculty, Research Institute of Sports and Sports Medicine, Moscow State Academy of Physical Education, Moscow, Russia

Abstract

Objectives: This study aimed to study the effect of exercise intervention under energy metabolism on obesity in obese college students and to analyze the body of obese college students. **Methods:** Fifty-six obese college students were selected as the study subjects and randomly divided into control group and observation group. In the control group, 28 cases were treated with a routine exercise intervention, while 28 cases in the observation group were treated with exercise intervention based on the energy metabolism, and the fat degree, fat content, and muscle weight of the two groups were observed and recorded. **Results:** Compared with the control group, the obesity degree of the observation group was significantly lower, and there was a significant difference between the two groups ($P < 0.05$). Compared with the observation group, the fat content in the control group was relatively high, and there was a significant difference between the two groups ($P < 0.05$). The growth rate of muscle in the observation group was obviously higher than that of the control group, and there was a significant difference between the two groups ($P < 0.05$). **Conclusions:** The application of exercise intervention under energy metabolism to the obesity of obese college students could effectively increase the muscle weight of college students and reduce the fat content and fat degree.

Keywords: Control group, energy metabolism, muscle weight, obesity

Introduction

Obesity is a metabolic disorder syndrome caused by excessive accumulation of body energy and excessive accumulation of fat in the body.[1] With the development of the economy and the improvement of the living standard, people's work and lifestyle begin to change – the diet structure is not reasonable, the amount of exercise is decreasing, the weight is rising, and the following disease seriously endangers human health and life. At present, aerobic exercise is the most direct method and fundamental measure to prevent obesity in the world. At present, the proportion of obesity among college students is increasing. For the special group of obese college students, the relevant departments should pay more attention to the aerobic exercise so that the obese college students often participate in sports activities to improve the body shape and body composition. The study shows that aerobic exercise combined with diet control and behavior correction is more effective than any single treatment method.[2] It can effectively control the body fat content and reduce the effect of blood lipid and weight loss.

Overview

Sixty-eight obese college students from different disciplines and specialties were randomly selected for a rigorous physical examination before the experiment. Inclusion criteria were as follows: simple obesity, no movement contraindication, no medication related to weight loss in 6 months, and no weight loss for 3 months. In the 8-week experiment, there were 56 people who met the experimental requirements, including 26 boys and 30 girls [Table 1].

Access this article online

Quick Response Code:

Website: www.matrixscimed.org

DOI: 10.4103/MTSM.MTSM_13_19

Address for correspondence: Prof. K. W. Dong, Wuhan Sports University, Wuhan, 43000, China. Moscow State Academy of Physical Education, Moscow, Russia. E-mail: baohui.wang@yahoo.com

How to cite this article: Dong KW, Xue XX. A study on the effect of sports intervention based on the energy metabolism on body composition of obese college students. Matrix Sci Med 2020;4:41-3.

Received: 12-06-2019, **Accepted:** 17-07-2019, **Published:** 08-06-2020

Methods

This experiment was conducted in a university laboratory in Shanxi. The test was carried out using the motor cardiopulmonary function test system and the Inbody370 body component analyzer. The test time was from 13:30 to 15:30 p.m. The test conditions were 22–25°C at room temperature. Using body mass index (BMI), waist-to-hip ratio (WHR), vital BMI, fat volume, body fat rate, abdominal fat as test indexes, and the changes of data in the two groups before and after the experiment were analyzed to judge the aerobic exercise.

Obesity examination index was calculated as obesity (%) = (actual weight [kg]−standard weight [kg]/standard weight) × 100%; obesity (%) was divided into six categories: low weight <10, normal 10–10, overweight 10–20, mild obesity 20–29, moderate obesity 30–50, and severe obesity >50. BMI was calculated as BMI = body weight (kg)/height (m^2), with a normal value of 18.5–22.9 (kg/m^2), overweight >23 (kg/m^2), and obesity >25 (kg/m^2). WHR was calculated as WHR = waist circumference/hip circumference, and the standard of obesity for male was >1 and for female was >0.84; body fat rate was within the normal range; males were 15%–18% and females were 25%–28%. The relevant formulae used were The relevant formula used is the maximum heart rate = 22 20-age; standard weight = (height to 100) × 0.9; and vital mass index = vital capacity (ml)/body weight (kg). The intensity of aerobic exercise was calculated according to the Cass grain formula:[3] Total Hip Replacement (THR) = (maximum heart rate resting heart rate) × 60% ~ 80% HRmax + resting heart rate.

Table 1: General information

Group	*n*	Age	Weight (kg)	Height (cm)	*t*	*P*
Observation group	28	19±1.4	70±2.5	170±0.21	0.32	0.035
Control group	28	22±0.2	65±1.92	169±0.24	1.72	0.045

Results

After 8 weeks of aerobic exercise, there were significant changes in seven indexes, such as BMI, WHR, and the vital capacity index of the obese male college students before and after the experiment ($P < 0.01$). It showed that aerobic exercise had an obvious effect on exercise weight loss and could change the above indexes to a certain extent [Table 2].

After 8 weeks of aerobic exercise, there were significant changes in the values of seven indexes, such as BMI, WHR, and the vital capacity index of obese female college students before and after the experiment ($P < 0.01$), indicating that aerobic exercise could improve the above index to a certain extent [Table 3].[4]

Conclusions

After 8 weeks of aerobic exercise test, BMI, WHR, obesity, and body fat rate of the male body decreased significantly compared with those before the experiment, and the difference was statistically significant ($P < 0.01$). After the experiment, BMI and obesity still did not reach the normal range and still belonged to obese people. After the experiment, the WHR of boys decreased significantly compared with that before the experiment ($P < 0.01$) and reached the normal range. After 8 weeks of oxygen exercise, the BMI, WHR, obesity, and body fat rate decreased significantly after the experiment. The difference was statistically significant ($P < 0.01$). The body fat rate after the experiment still did not reach the normal range, and it still belonged to the obese people. After the experiment, the BMI, WHR, and obesity of girls were significantly lower than those before the experiment. It was statistically significant ($P < 0.01$) and reached the normal range. Although the data show that the body shape and body composition of the 8 weeks aerobic exercise experiments have improved, there is still a disagreement on the evaluation criteria for obesity, which may be caused by the restriction of sports events during the exercise process and may also be the deficiency of the evaluation criteria for obesity. Therefore, a comprehensive evaluation system should also be

Table 2: Male body composition measurement data

Group	*n*	BMI (kg/m^2)	WHR (%)	Vital body mass index (kg)	Obesity (%)	Body fat rate (%)
Observation group	12	28.75±1.51	0.92±0.05	30.52±8.21	25.4±0.2	84.2±2.9
Control group	8	26.2±2.2	52.1±4.33	22.4±11.12	23.6±1.2	81.4±1.2
t		12.451	1.241	6.242	5.873	11.452
P		0.000	0.032	0.001	0.001	0.000

BMI: Body mass index, WHR: Waist-to-hip ratio

Table 3: Female body composition measurement data

Group	*n*	BMI (kg/m^2)	WHR (%)	Vital body mass index (kg)	Obesity (%)	Body fat rate (%)
Observation group	16	26.21±1.51	0.54±0.22	26.21±4.12	22.1±1.2	76.1±1.2
Control group	20	24.21±2.2	46.2±2.11	19.2±8.13	19.6±0.7	70.1±0.42
t		9.421	0.824	10.254	7.251	9.241
P		0.001	0.056	0.000	0.000	0.000

BMI: Body mass index, WHR: Waist-to-hip ratio

introduced in the future evaluation process. Longterm aerobic exercise can effectively control body weight. Exercise weight loss combined with diet control is more effective for obese people to lose weight. Aerobic exercise can improve the related functional level of sports college students, especially on the level of cardiopulmonary function. In addition, aerobic exercise can effectively improve the body shape, while losing weight and improving the physical function level, it has a positive effect on the physical and mental health of obese college students.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kelin M. Observation of the effect of aerobic exercise prescription on the simple obesity of college students. Pract Prev Med 2014;2:223-4.
2. Danal W. Advanced Exercise Physiology-Theory and Application. Vol. 6. Beijing, China: Higher Education Press; 2013. p. 311-425.
3. Willn P. Biologic analysis of obesity and aerobic exercise for weight loss. J Sport Univ 2015;24:62-3.
4. Calico EA, Research progress on the effects of physical exercise on body composition. J Changchun Norm Univ 2014; 33:115-7.