

Effects of high intensity intermittent training on muscle glycogen content in obese adolescents

Long liu*

*School of Physical Education , Anyang Normal University, Anyang 455000, China

*Corresponding author e-mail: Liulong@aynu.edu.cn

ABSTRACT. *Objective: To investigate the effects of high intensity intermittent training on muscle glycogen content in obese adolescents. Methods: a total of February 2013 to 2015 February 198 patients to our hospital in obese adolescents were retrospectively studied, divided according to the intensity of training for high intensity interval training group (group A), in intensity interval training group (group B) and low intensity interval training group (Group C) 66 cases in each, than the changes of content of inositol is 3 groups of patients. Results: there is a significant difference between the 3 groups of patients with total efficiency, with significant difference ($P < 0.05$); the weight of a group (102.9 ± 10.6) kg, inositol content (56.9 ± 2.1) IU / L, 111.3 ± 11.6 kg of body weight in group B, inositol content (78.8 ± 2.9) IU / L, the weight in the mice of group C (120.3 ± 12.3) kg, inositol content (10.96 ± 2.8) IU / L, group A, group B and group C patients between weight and inositol content exist significant difference had statistical significance ($P < 0.05$). Conclusion: high intensity intermittent training on obese adolescents, can improve the muscle content of patients, it is worthy of popularization and application.*

KEYWORDS: *Obese adolescents, muscle glycogen content, high intensity interval training*

1.Introduction

High-intensity interval training can reduce fat levels and insulin levels in obese patients, but there are not many studies on improving muscle glycemic content in obese patients. Research on obesity and fat reduction in obese adolescents Luo Yaxin believes that high-intensity interval training can help high school Girls' weight loss[1]; Lou Jingjing et al. Believe that high-intensity interval training can effectively reduce weight and fat content, but it cannot clearly prove that high-intensity interval training

is better than medium-intensity continuous training in reducing weight and fat[2]; Wei Yi found that the weight loss effect of policemen in the high-intensity interval training group was more significant than those in the other groups and the muscle glucose content improvement group of obese persons after experimental intervention[3]; Li Yongming pointed out that the general population was the research object. The literature indicates that high-intensity interval training can improve fat oxidation ability and improve muscle sugar content of obese adolescents. It is a time-saving and effective exercise exercise, but more research on the mechanism of HIT to improve fat oxidation ability is still needed. In addition, the development of high-intensity interval training in Luo Yaxin's research helps high school girls improve their attitudes, behaviors, behavioral intentions, and supervisors' standards in participating in physical exercise^[1]; Zhang Ge considers high intensity Intermittent training has significantly increased muscle endurance in healthy adult men, improved muscle glycemic content in obesity, increased exercise pleasure, and significantly increased interest in sports[4]; Wang Jingjing research pointed out that high-intensity interval training can improve the health of ordinary healthy people There is a very good effect of reducing the muscle sugar content of obese people, so this study was conducted to determine the effect of high-intensity intermittent training on improving the muscle sugar content level of obese adolescents.

2. Research objects and methods

2.1 General Information

A retrospective study of 198 obese adolescents who came to our hospital from February 2016 to February 2019 was performed in our hospital. All patients were diagnosed as obese adolescents, aged 10-20 years. Excluded[5]: (1) have infectious diseases in the past month; (2) have chronic diseases such as hypertension, diabetes; (3) have a family history of genetic diseases; (4) limb diseases. According to different treatment methods, it is divided into high-intensity interval training group, medium-intensity interval training group and low-intensity interval training group, of which 66 patients are in high-intensity interval training group, 36 are male, 30 are female, age is 14-20 years, average age is 16.9 ± 2.6 years; 66 patients in the

medium-intensity intermittent training group, 37 males and 29 females, aged 15-20 years, mean age 16.6 ± 2.9 years; 66 patients in the low-intensity intermittent training group, 35 males, 31 females, and age 14-19 years old, with an average age of 16.5 ± 1.8 years. There was no significant difference in general information among the three groups of patients, there was no statistical significance ($P > 0.05$), and they were comparable.

2.2 Method

All three groups of patients were trained on cardiopulmonary exercise power carts (provided by Meikei (Beijing) Technology Co., Ltd.). The determination of muscle glucose was performed in accordance with a creatine enzyme-linked immunosorbent kit.

Group A: The patients stepped on the power car at 95% of the peak power intensity for 1 minute, and completely rested for 1 minute, totaling 30 minutes.

Group B: Patients continued to step on the power car at 75% peak power intensity, 6 minutes as a group, 6 groups each time, with a rest of 1 minute between groups.

Group C: Patients continued to step on the power car at 50% peak power intensity, 6 minutes as a group, 6 groups each time, with a rest of 1 minute between groups. The assay was performed according to a creatase enzyme-linked immunosorbent kit.

2.3 Judgment criteria for treatment effect

Significant effect: After treatment, the patient's weight was significantly reduced, and the muscle sugar content returned to normal;

Effective: After treatment, the patient's weight is reduced, and the muscle sugar content is significantly reduced;

Ineffective: The patient's muscle glucose and weight did not change after treatment.

Total effective rate = significant efficiency + effective rate.

2.4 Statistical methods

Data analysis was performed using SPSS17.0 statistical software. Measurement data were expressed as mean \pm standard deviation ($\pm s$), measurement data were tested by χ^2 , count data were tested by t test, and $P < 0.05$ indicated a difference, which was statistically significant.

3 Results and discussion

3.1 Comparison of treatment effects between two groups of patients

The specific results are shown in Table 1. From Table 1, it can be seen that there is a significant difference between the total effective rates of the three groups of patients, which is statistically significant ($P < 0.05$).

Table 1-3 Comparison of treatment effects of patients (n%)

	Marked effect	effective	invalid	Total efficiency
Group A (n=66)	40(60.6)	24(36.4)	2(3.0)	64(97.0) *
Group B (n=66)	35(53.0)	21(31.8)	5(7.6)	61(92.4) *
Group C (n=66)	30(45.5)	28(42.4)	8(12.1)	58(87.9)

Note: Compared with group C, * $P < 0.05$

3.2. Comparison of Body Muscle Glucose Contents in Three Groups of Patients

See Table 2 for details. From Table 2, we can know that the weight of group A is (102.9 ± 10.6) kg and the content of muscle sugar is (56.9 ± 2.1) IU / L. The weight of group B is (111.3 ± 11.6) kg and the content of muscle sugar is (78.8 ± 2.9) IU. / L, group C body weight (120.3 ± 12.3) kg, muscle sugar content (109.6 ± 2.8) IU / L,

there is a significant difference in body weight and muscle sugar content between patients in groups A, B and C, with statistical significance ($P < 0.05$).

Table 2 Comparison of body muscle glucose content of three groups of patients ($\pm s$)

Group	body weight(kg)	Muscle sugar(IU/L)
Group A (n=66)	103.1 \pm 10.6*	56.9 \pm 2.1*
Group B (n=66)	112.3 \pm 11.6*	79.1 \pm 2.9*
Group C (n=66)	119.8 \pm 12.3	108.9 \pm 2.8

Note: Compared with group C, * $P < 0.05$

3.3 Discussion

Juvenile refers to the age range from 14 to 20 years of age, after childhood and before adulthood. Appropriate high-intensity interval training can accelerate fat consumption, improve the body's glucose and lipid levels, and thus improve the physical condition of adolescents [4]. With the improvement of people's level, more and more obesity occurs in adolescents, showing an upward trend. This obesity will be accompanied by some complications, such as coronary heart disease and type 2 diabetes. The main cause of the disease is sedentary, inadequate lifestyle or high-calorie diet. Therefore, taking proper exercise and controlling diet are the basic methods for preventing and controlling obesity. There have been studies on high-intensity intermittent training to improve the fat level and metabolic capacity of obese patients, but there has been no report on the study of muscle sugar content. Therefore, this study is of great significance for further research[9].

The intermittent training method is to use the hypoxic meter to let the trainee intermittently inhale the gas below the normal partial pressure of oxygen in the plain, causing moderate hypoxia in the body, which leads to a series of anti-hypoxia physiology that is beneficial to improving aerobic metabolism, Biochemical

adaptation to achieve the purpose of altitude training. In sports practice, intermittent hypoxic training as an auxiliary training method, interspersed with conventional training, can maximize the development of trainees' functional potential, and comprehensively improve the body's metabolic capacity. High-intensity intermittent training is a training technique that allows you to perform full-power, fast, and explosive training in a short time. This technique allows you to increase your heart rate and burn more calories in the short term. A high-intensity exercise increases the body's need for oxygen and creates a state of hypoxia, causing your body to need more oxygen during recovery[10-12]. This exercise leads to excessive oxygen consumption after exercise. That's why, compared to regular aerobic training and steady-state exercise, high-intensity exercise will help you burn more fat and calories. Accelerate metabolism. Combining high intensity with intermittent can lead to excessive oxygen consumption after exercise, which can accelerate your metabolic rate. After completing a full set of HIIT exercises, your metabolic rate can be improved within 48 hours. This means that even if you have left the gym, you are still burning fat.

This study compared the effects of intermittent training with different intensities on improving the body weight and muscle sugar content of obese adolescents. Through research, we found that using high-intensity intermittent training can accelerate patients' fat consumption, and muscle sugar will also decrease. The results showed that the total effective rate of patients after high-intensity training was 97.0%, which was significantly higher than the total effective rate of medium-intensity and low-intensity training. Moreover, the weight of adolescent obese patients after high-intensity intermittent training was significantly reduced, which was significantly better than medium-intensity. With low-intensity interval training, the patient's muscle glucose level also gradually returned to normal levels[13-15]. After using high-intensity interval training, the patient's weight and muscle glucose level were significantly improved, and more in line with the training mode of obese patients.

4. Conclusion

In summary, high-intensity interval training for obese adolescents can improve muscle glycemic content in patients, which is worthy of popularization and application.

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