Design of Weight Loss Training System for College Students based on Exercise and Dietary Intervention

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Abstract
Exercise can improve body metabolism and increase body heat loss, so as to achieve weight loss purposes. In this paper, the author analyzes the design of weight loss training system for college students based on exercise and dietary intervention. After aerobic exercise and diet intervention, obesity can be significantly reduced, and the body shape of obese patients can be obviously improved. At the same time, exercise can enhance physical fitness; promote health, so that the incidence of chronic diseases closely related to obesity is greatly reduced. In addition, weight loss is a long-term process; we must establish a long-term appropriate amount of exercise concept, proper diet.

Key words: Dietary intervention, Obesity rate, Metabolic changes, Exercise intensity

1. INTRODUCTION

The university stage is the human body in the golden stage of gold in life, keep the body in a healthy weight range is not only related to their future learning and life, but also for the future to better serve the social conditions. Under the aesthetic standards of "lean beauty", obesity is clearly not in line with the aesthetic standards of contemporary people, and even more serious is that obesity can also lead to hypertension, hyperlipidemia, type 2 diabetes and other complications. Obesity and overweight also have direct and indirect effects on adolescents' self-esteem, even more severe, even anxiety and depression. It is very important to control overweight rate and obesity rate of college students to help obese college students reduce their obesity degree. Bad eating habits and lifestyle is the main reason causing obesity or overweight obese college students are: emphasis on taste, like oil salt heavy spicy food, eating too fast. Eating preference, greasy and spicy, irregular eating time and fast eating speed are the main causes of College Students' obesity. The more meat and eggs you eat, the greater the risk of getting fat. Long term diet, greasy, high calorie food, increased the burden of the internal organs, leading to obesity. Preference for fried foods, sugary drinks such high calorie foods, lack of exercise is the main cause of overweight and obesity. Nowadays, weight loss, control means many surgical fat slimming drugs, acupuncture and massage to lose weight, simple diet, exercise and so on. Among them, sports weight loss, safety, health, rebound rate is widely recognized. Exercise is to improve the body metabolism, increase the loss of body heat, so that the daily intake of the body is lower than the daily consumption, so as to achieve the purpose of weight loss. In addition, weight loss is a long-term process, we must establish a long-term appropriate amount of exercise concept, proper diet diet.

Among many weight loss methods, exercise weight loss is recognized by obese people for its safety, simplicity, convenience and economy. Exercise, as a stressor, can cause complex stress effects in the body. It affects the composition, structure and metabolic changes of human body through a series of complex processes. Proper exercise can reduce the accumulation of fat in obese patients and achieve the purpose of weight loss. At the same time, exercise can enhance physical fitness, promote health, so that the incidence of chronic diseases closely related to obesity is greatly reduced. This health promoting effect is not what other weight loss methods do. The movement is different from the treatment of obesity obesity prevention, not only need to consume excess energy, the more important is the need to ensure the highest proportion of fat oxidation and energy movement, the movement in which material for energy. Studies have shown that exercise can change the composition of fatty acids. Long term exercise can increase the proportion of unsaturated fatty acids (especially n-6 polyunsaturated fatty acids) in blood, and reduce the proportion of monounsaturated fatty acids. The change of fatty acid composition is closely related to exercise intensity and mode of exercise. Relevant studies have confirmed that the implementation of aerobic exercise intervention, obesity patients lipid metabolism, insulin resistance, etc., can be improved to varying degrees. However, there is no report on the selective use of fatty acids by skeletal muscle during aerobic exercise. Different types of fatty acids of different diseases affect the degree of dietary fatty acid intake balance is also a research hotspot. The possible mechanism but the different parts of the present weight loss difference has no systematic study, the reason is; there is little research system for exercise; rarely have a certain scale of exercise team and the mechanism of physical exercise to lose weight; the weight loss process in different parts of the fat there is little research use position difference; however, the effect of exercise to lose weight position difference, in this regard, many people do not know the existence of
this phenomenon. Because of the effect of exercise to lose weight position difference, urgent need to find solutions to body fat during exercise to lose weight drop method and the way of location difference, in order to improve the shape of the body of obese patients, improve the effect of exercise to lose weight.

2. STUDY ON OBESITY OF COLLEGE STUDENTS

2.1. Obesity hazards among College Students

The harm of obesity can be divided into specific harm and non-specific harm. Specific hazards refer to disorders of lipid metabolism, substance metabolism and energy metabolism in the body, and can also be called metabolic syndrome. Nonspecific disorder refers to the common problems caused by excessive body fat and excessive accumulation of body fat. College students over obesity can cause physical burden, thereby affecting the slow action, resulting in physical decline. Excessive fat accumulation will increase the burden on the body, make the body more slow action, can cause severe gouty arthritis, osteoarthritis; fat accumulation caused by serious waist and abdomen, upper arm, thigh skin fat extrusion, eczema, dermatitis, problem prone to fungal infections. Excessive fat accumulation can cause common arthritis, dermatitis, slow and other common problems, it will cause the metabolic disorder, which leads to all kinds of common diseases. Obesity is a health problem that can not be ignored, the correct evaluation of the degree of obesity is of great significance for the prevention and treatment of obesity, weight loss and obesity related disease evaluation. At present, the main indicators of obesity are: BMI, body circumference, body fat rate, etc..

With the increasing rate of obesity, weight loss methods are diverse, mainly divided into three categories: medical weight loss, simple diet, exercise weight loss.

- Medical weight loss: Drug weight loss is achieved by reducing energy intake, reducing absorption of nutrients, so as to achieve weight loss purposes. But taking diet pills will bring adverse reactions, taking phenylpropanolamine, possible intracranial hemorrhage or subarachnoid hemorrhage; such as long-term use of fenfluramine and dexfenfluramine, sibutramine, heart valve will cause irreversible damage, cause heart disease; at present the country approved weight-loss drug fenfluramine, sibutramine are due to adverse reactions has been banned, only orlistat orlistat, and what exactly does sequelae has not yet been confirmed. Acupuncture is through regulating nerve endocrine function, promote the body metabolism, reduce consumption, so as to achieve the purpose of reducing fat.

- Simple dieting: Simple dieting means to reduce weight by reducing food intake. But losing weight by starving loses weight, muscle, and muscle tissue and visceral organs, while losing weight. Long term excessive diet can cause vitamin and inorganic salt deficiency, electrolyte disorders and so on, and more severe will endanger life.

- Exercise weight loss: Exercise weight loss is the most scientific way to lose weight, through exercise so that consumption is greater than intake, so as to achieve the purpose of weight loss. Exercise can improve the body shape of obese adolescents and promote their physical health. Long term low intensity aerobic exercise plus diet control is an effective way to lose weight.

2.2 Effect of exercise on obesity

Through exercise, children's body weight, fat weight, BMI, rate system, thigh circumference, waist circumference, hip circumference, thigh circumference, waist hip ratio, height than hip height ratio than the phase weight before decreased, can improve the body shape of young children. With the continuous development of society, advanced science and technology will be liberated people from the troubles of physical...
activity, more food filling, the prevalence rate of hypertension is also showing a rising trend. The individual characteristics of sports must be suitable for patients, such as the choice of jogging, brisk walking, recreational sports, aerobics and sports can maintain a longer period of time. The right sport must first be of interest, avoid sports boredom and become negative factors to lose weight; exercise intensity should not be too large, such as fast running, fast swimming, ball games prone to fatigue. The sports exercise intensity is too large, the duration of obesity patients can adhere to the short, exercise time because of the limited body and not good use of fat for energy: first, exercise intensity is too large is not conducive to the sports consumption of fat in the body, and exercise time to consume more glycogen in experience the metabolism of blood glucose decline, increased appetite. The accumulation of lactic acid in the body is also not conducive to the oxidation of fat decomposition; second, for obese patients, exercise intensity is too large, there may be some security risks, easy to cause sports injuries. Exercise intensity exercise is not suitable for small weight, strength is too small to achieve the movement of the heart rate for the fat burning rate target, cannot produce a certain degree of stimulation on the body, it is impossible to achieve the desired therapeutic effect. Therefore, obese patients should choose the dynamic and rhythmic exercise that the large muscle groups participate in. Studies have shown that the combination of different sports can eliminate the boredom of the participants. Therefore, in the process of sports treatment of obesity, choose a variety of sports items match, can improve obesity patients participate in exercise to reduce weight of enthusiasm. If you can choose brisk walking and swimming: quick walk to the swimming pool, also equivalent to complete part of the preparatory activities and finishing activities.

![Diagram of exercise weight loss](image)

**Figure 2. Exercise weight loss**

Exercise intensity is mostly expressed by heart rate, percentage of maximal heart rate and percentage of maximal oxygen uptake. In the treatment of obesity, it is generally believed that its intensity is 60%-80% of the maximum heart rate, and when the maximal oxygen uptake is 50%-70%, the ideal weight loss effect can be achieved. Because of the range of motion intensity, the rate of lipid oxidation is in the most ideal state. Because of the quiet heart rate also affects the rate of fat oxidation, so only through the heart rate and maximal exercise intensity to determine the oxygen content is not scientific, ignoring the impact of heart rate on lipid oxidation rate may be determined from the objective exercise intensity. Diet control in exercise weight loss is a scientific behavior. It is different from dieting alone. The only way to lose weight is to lower energy intake than energy consumption, and to control energy intake. In the exercise of weight loss, the basis for the control of diet is energy consumption is greater than energy intake, focusing on increasing energy consumption. Exercise combined with proper diet control is an ideal way to treat obesity. It can achieve satisfactory weight loss effect, and also has obvious promoting effect on health. Exercise treatment of obesity principle is to increase the body’s energy consumption by exercise, the body will be redundant fat consumption, and then achieve the purpose of weight loss. Exercise to maintain good eating habits, diet control limits of total calories, diet control should be gradual and moderate as appropriate, to ensure a balanced nutrition, can not be expanded to all nutrient limitation. Therefore, diet control must also ensure that there is a normal amount of high quality food protein supply in order to maintain normal nitrogen balance during the weight loss period, but the food protein supply should not be too much. Strict control of fat intake, carbohydrate intake should be accounted for 40%-55% of the total daily calories, and ensure adequate and balanced diet of vitamins and inorganic salt supply.
3. EXERCISE AND DIETARY INTERVENTION

3.1. Research objects and methods

Aerobic exercise is an effective method for the treatment of obesity, but the changes of fatty acids in obese patients after exercise intervention are not clear. Study confirmed that aerobic exercise intervention, lipid metabolism and insulin resistance in obese patients have different degrees of improvement, but during aerobic exercise on skeletal muscle, fatty acid has not been reported whether there is selective use. Different kinds of fatty acids have different effects on disease, and the balance of dietary fatty acid intake is also a hot research topic. Not only the ratio of n-3 PUFA and n-6 PUFA should be balanced, but also the proportion of SFA, MUFA and PUFA should be appropriate. In exercise weight loss practice, the determination of serum fatty acid composition is helpful to evaluate individual nutrition and health status. In the fully closed long exercise to lose weight 40 class in my school (19 females, 21 males) in simple obesity patients as the research object, age 18-25 years, BMI = 32, body fat rate greater than 38%.

Exercise and nutrition program, comprehensive exercise load test results and the health status of the subjects, formulate personalized exercise prescription, with heart rate as the monitoring index of exercise intensity. Through the calculation, the subjects of the target heart rate between 114~138 beats / min, heart rate does not exceed the maximum of 138 beats per minute. During exercise, subjects wore a heart rate meter, which was monitored and monitored by professional sports medical supervisors. The exercise heart rate was maintained within the target heart rate range. About 90% of aerobic exercise in sports arrangement, 10% small load resistance exercise: considering the subjects with higher levels of obesity, in order to reduce its weight on the ankle and knee joint pressure, early intervention, aerobic exercise program selection by swimming, elliptical instrument movement; resistance movement by less than 3 pound dumbbells, exercise upper limb muscles, improve skin relaxation may cause weight loss. In the middle period of intervention, we should increase the interesting sports games and sports competitions on the basis of the previous. The degree of obesity has declined, but it is still at a high level. The main items of aerobic exercise include swimming, elliptical instrument movement; resistance movement by less than 3 pound dumbbells, exercise upper limb muscles, improve skin relaxation may cause weight loss. In the middle period of intervention, we should increase the interesting sports games and sports competitions on the basis of the previous. The degree of obesity has declined, but it is still at a high level. The main items of aerobic exercise include swimming, elliptical instrument movement; resistance movement by less than 3 pound dumbbells, exercise upper limb muscles, improve skin relaxation may cause weight loss. In the middle period of intervention, we should increase the interesting sports games and sports competitions on the basis of the previous. The degree of obesity has declined, but it is still at a high level. The main items of aerobic exercise include swimming, elliptical instrument movement; resistance movement by less than 3 pound dumbbells, exercise upper limb muscles, improve skin relaxation may cause weight loss.

Specific dietary principles are as follows:

(1) control total heat: The most effective way to lose weight is to control diet and increase physical activity. Control energy intake should be balanced nutrition, reasonable arrangements of protein, fat and carbohydrates, to ensure the adequate supply of inorganic salts and vitamins. Change recipes every week during diet to ensure full intake of nutrients.

(2) the supply of protein: In order to maintain the normal nitrogen balance of the organism, it is necessary to ensure the normal supply of high quality food protein in the food. Don't overdo it to avoid increasing the burden on the liver and kidneys.

(3) limit the intake of fat: Reduce the amount of food intake, try to eat less fried foods and fat, so as not to increase lipid peroxides, resulting in decreased activity endurance.

(4) the supply of carbohydrates should be moderate: Carbohydrates, namely carbohydrates, are the main nutrients for energy supply, and they are essential nutrients for the human body. Foods with low expected
glycemic index (GI) have long gastrointestinal retention and slow release. Glucose enters the blood with low peak value and slow down.

![Figure 4. Weight-loss goals](image)

3.2. Statistical processing
Statistical analysis using statistical software package SPSS20.0, standard deviation of measurement data using (x±SD) said that the same index of aerobic exercise intervention at every stage of the single factor analysis of variance of repeated measurement, continuous variables do not conform to the normal distribution, using the nonparametric Wilcoxon rank sum test. When P<0.05, the difference was significant, statistically significant. When P<0.01, the difference was very obvious, with very significant statistical significance.

4. RESEARCH RESULTS
4.1. Changes in body shape
After 18 weeks of moderate intensity aerobic exercise and diet intervention, 40 obese patients with weight, BMI, body fat, waist circumference, hip circumference, waist to hip ratio were significantly decreased in the camp, has significantly difference (P<0.01).

<table>
<thead>
<tr>
<th>Table 1. Body shape index</th>
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<tbody>
<tr>
<td><strong>index</strong></td>
</tr>
<tr>
<td>Height (CM)</td>
</tr>
<tr>
<td>Body weight (kg)</td>
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<tr>
<td>BMI</td>
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<tr>
<td>Body fat percentage (%)</td>
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</tbody>
</table>

The dietary intake of participants in each week was recorded in detail, and the actual intake in the first week was analyzed. The results showed that table 2.

<table>
<thead>
<tr>
<th>Table 2. Daily nutrients</th>
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<tbody>
<tr>
<td><strong>Nutrient substance</strong></td>
</tr>
<tr>
<td>Protein</td>
</tr>
<tr>
<td>Fat</td>
</tr>
<tr>
<td>carbohydrate</td>
</tr>
<tr>
<td>Daily total calories</td>
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</tbody>
</table>

Before and after intervention, the contents of fatty acids were PUFA > SFA > MUFA. After ninth weeks of aerobic exercise and diet intervention, the decrease of serum TFA, UFA, MUFA, PUFA, n-6 PUFA and n-3 PUFA in patients with severe obesity was significantly different from that in the entry into the camp. TFA, UFA, MUFA, PUFA and n-6 PUFA decreased significantly after eighteenth weeks of intervention.
Table 3. Changes of serum fatty acid classification after aerobic exercise and diet intervention

<table>
<thead>
<tr>
<th>index</th>
<th>1 week</th>
<th>9 week</th>
<th>18 week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fatty acids (TFA)</td>
<td>3153.64±819.47</td>
<td>2258.51±617.39</td>
<td>2054.12±915.67</td>
</tr>
<tr>
<td>Saturated fatty acids (SFA)</td>
<td>1134.26±217.52</td>
<td>968.85±205.49</td>
<td>873.29±228.27</td>
</tr>
<tr>
<td>Unsaturated fatty acids (UFA)</td>
<td>2172.15±542.29</td>
<td>1682.52±526.21</td>
<td>1581.24±482.17</td>
</tr>
<tr>
<td>Monounsaturated fatty acids (MUFA)</td>
<td>814.48±213.63</td>
<td>613.54±138.91</td>
<td>628.22±214.65</td>
</tr>
<tr>
<td>Polysaturated fatty acids (PUFA)</td>
<td>1472.19±364.35</td>
<td>1057.29±414.65</td>
<td>976.24±425.13</td>
</tr>
<tr>
<td>N-6 PUFA</td>
<td>1235.61±317.24</td>
<td>1042.37±374.13</td>
<td>948.13±412.42</td>
</tr>
<tr>
<td>N-3 PUFA</td>
<td>117.14±42.39</td>
<td>72.35±42.14</td>
<td>80.12±60.42</td>
</tr>
</tbody>
</table>

5. DISCUSS

Long time aerobic exercise refers to the aerobic metabolic state for a long time, the dynamic type, in the big muscles of rhythm, is a can make the blood circulation system, respiratory movement effective stimulation. Aerobic exercise mainly relies on the oxidative decomposition of fat to provide energy. By increasing the consumption of exercise energy to reduce the accumulation of body fat, it is pointed out that aerobic exercise can effectively reduce the volume of fat cells. Long time aerobic exercise, blood insulin, glucagon and catecholamines in vivo and the secretion of epinephrine may increase, the rate limiting enzyme of lipolytic activity increased, the suitable exercise activation of the beta oxidation pathway, accelerate fat mobilization, promote the decomposition and utilization of fat, increased FFA use, reduce the sugar into fat the function of the transformation. Basal metabolic rate reduction is an important factor contributing to obesity. Exercise not only consumes calories, but also increases resting metabolic rate and affects the special dynamic action of food. Regular exercise can increase the resting metabolic rate of patients with obesity, force intensity and duration of exercise up to a certain level of food will change significantly, fat consumption increased significantly. In this study, 40 obese patients after 18 weeks of moderate intensity aerobic exercise combined with diet control, body fat rate decreased significantly, this is due to the small and medium intensity aerobic exercise enhanced lipolysis, releasing FFA aerobic exercise as a source of energy by their skeletal muscle, thereby effectively reducing body fat the content of obese patients. Accordingly, body weight, BMI, body fat rate, waist circumference, hip circumference, waist hip ratio also decreased significantly. According to the individual situation of the subjects, the diet program was formulated to correct the excessive eating habits of excessive heat intake, and to ensure the supply of essential nutrients. 18 weeks of aerobic exercise and diet control reduced obesity in patients with severe obesity, body shape has a good improvement.

6. CONCLUSION

In conclusion, this study found that aerobic exercise and diet intervention can significantly reduce obesity and improve the body shape of obese patients. At the same time, exercise can enhance physical fitness, promote health, so that the incidence of chronic diseases closely related to obesity is greatly reduced. This health promoting effect is not what other weight loss methods do. The movement is different from the treatment of obesity obesity prevention, not only need to consume excess energy, the more important is the need to ensure the highest proportion of fat oxidation and energy movement, the movement in which material for energy.

References