

Study on the Effect of Carbohydrate Exchange Method on the Physical Health of Obese People

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Abstract

In recent years, due to unreasonable dietary structure, irregular diet, lack of exercise and many other factors, obesity has become an important problem that affects the health of residents and induces various diseases. The carbohydrate exchange method plays an important role in controlling weight and solving obesity problems. Based on this, this paper selects 40 school students with overweight or obesity problems, measures the body fat rate, body mass index and other relevant data of the experimental subjects, uses the carbohydrate exchange method to intervene in the obese population,, and comprehensively compares the data changes before and after the intervention. The results of the study showed that after the intervention of the carbohydrate exchange method, the body mass index, glycosylated hemoglobin, fasting blood glucose, and systolic blood pressure of the experimental subjects were all decreased, and the difference was statistically significant ($P<0.05$), indicating that the carbohydrate exchange method is of great significance to improve the blood glucose level of obese people and solve the problem of obesity.

Keywords

Carbohydrate Exchange Method; Dietary Intervention; Obese People; Physical Health.

1. Introduction

In recent years, under the background of sustained and rapid economic and social development, the living standards of the general public have shown a good trend of continuous improvement, prompting people to make great changes in many aspects such as living habits and dietary structure. Relevant statistics show that over the past 40 years, affected by many factors such as fast food eating habits, sedentary and other factors, both the obese population and the obesity rate in China have shown a rapid growth trend. According to the relevant statistics of the "Report on the Status of Nutrition and Chronic Diseases of Chinese Residents (2020)", it can be known that the overweight and obesity rates of adult residents, children under the age of 6 and adolescents aged 6 to 17 in China have reached 50%, 10% and 20% respectively, and the total number of overweight and obese people is as high as 600 million. From this point of view, obesity and overweight have become a major public health problem facing China, especially the problem of adolescent obesity is becoming more and more serious. In fact, obesity can easily lead to cardiovascular disease, diabetes, hypertension, fatty liver and other related diseases, increase the load on the heart, and it have a greater negative impact on the health of residents. In this context, it is urgent to do a good job in obesity prevention and control. Therefore, this paper intends to select some school students who have the problem of overweight or obesity as the experimental object, and focus on the impact of carbohydrate exchange method on the physical health of obese people, so as to provide some reference for effectively coping with obesity.

2. Research Objects and Methods

2.1. Research Objects

40 subjects with simple obesity ($BMI \geq 25$) were selected openly, and the subjects were required to meet the following conditions: First, they were school students who did not suffer from cardiovascular disease and were in good health; second, they had no bad habits such as smoking and drinking; Third, the age range is 17-21 years old; Fourth, there is no history of systematic exercise. Forty subjects were divided into two groups. Among them, 20 received combined intervention (that is, 50% of carbohydrates were replaced with low-GI carbohydrates), and 20 received a simple intervention (no carbohydrate exchange). The experiment was carried out according to the plan and the detection of obesity-related body indicators before and after the experiment was completed. Among the experimental subjects, the number of males and females was 26 and 14, respectively.

2.2. Research Methods

In the two groups of experimental subjects, 20 school students with overweight or obesity problems were given ordinary dietary intervention, that is, publicity and education around relevant dietary precautions, food selection principles, food cooking methods and so on; Another 20 subjects with overweight or obesity were intervened by carbohydrate exchange method, mainly including the following steps: The first is to count the weight, height, body fat percentage, body fat mass, visceral fat and body muscle mass of the experimental subjects, and then calculate the BMI of 40 subjects based on the formula of $BMI = \text{weight} / \text{height}$. Based on this, judge and measure whether the subjects are overweight or obese. At the same time, according to the age, diet, exercise habits and other related conditions of the experimental subjects, we can determine a more targeted intervention energy segment. Generally, obese subjects and overweight subjects are given at the rate of 20kcal / kg and 25kcal / kg respectively. The second is to provide standard set meal food, that is, calculate the total amount of energy and carbohydrates required by the two groups of subjects every day, and then reasonably allocate the number of carbohydrates for each meal according to the carbohydrate exchange table. Third, after the experiment, strengthen the publicity of the healthy diet of the experimental subjects, and guide them to use the carbohydrate exchange table to scientifically manage their diet. Relevant subjects were required to carry out mild aerobic exercise including jogging, cycling and swimming within 1-2 hours after meals. The duration of each aerobic exercise should be maintained at more than half an hour, and the duration of aerobic exercise after meals should be more than two hours every week. For timely statistics and collection of relevant data, it is ensured that the two groups of experimental subjects were followed up by telephone once a week, and the follow-up time is about half a year.

2.3. Physical Examination

One is height and weight. The above two indexes are mainly detected by height and weight measuring instrument. After calibration, the height and weight shall be accurate to 0.1cm and 0.1kg. Second, waist circumference. Make sure that when the subject is upright, the feet are separated by about 30 cm. With the help of a soft ruler with a minimum scale of 1mm and no elasticity, circle the subject's abdomen in a horizontal direction. It should be noted that the soft ruler is close to the experimental object but does not squeeze its skin, so as to accurately measure the waist circumference of the experimental object, and the specific value is accurate to 1mm. The third is diastolic and systolic blood pressure. This experiment was mainly measured with a mercury-column standard cuff sphygmomanometer, and the average was taken after 2 measurements of the experimental subjects. The fourth is the waist hip ratio. After measuring the waist circumference and hip circumference of the experimental object, the

accurate value were calculated according to the waist hip ratio = waist circumference / hip circumference formula.

2.4. Quality Control

Before the beginning of this experiment, 40 school students with overweight or obesity were strictly trained. Before measuring the height, weight and other data of the experimental subjects, we began to calibrate and standardize the relevant measuring instruments to ensure that the error of the measuring instruments is less than 0.1cm and 0.1kg. At the same time, we used EpiData3.1 software to input the relevant data after measurement. After the data was entered, in order to effectively avoid errors, a consistency test was carried out.

2.5. Statistical Method

This experiment carried out statistical analysis on the relevant data based on SPSS20.0 statistical software. It should be pointed out that the measurement data was represented by

$Mean \pm standard\ deviation \left(\bar{x} \pm s \right)$, used t , χ^2 to test the relevant measurement resources and count data in line with the normal distribution respectively. Generally, $p < 0.05$ is considered to be statistically significant.

3. Experimental Results

3.1. Basic Situation

As mentioned above, a total of 40 school students with overweight or obesity were selected in this experiment and divided into two groups, with 20 cases in each group. The basic information and statistical analysis results of the two groups of subjects are shown in Table 1. After statistical analysis, it was found that there were significant differences in the basic situation of the two groups ($p < 0.05$).

Table 1. Comparison of the basic conditions of the two groups of experimental subjects

Information category	1 group (n=20)	2 group (n=20)	t/χ^2	p
gender[n(%)]			$X^2=0.036$	0.821
male	13(65)	14(70)		
female	7(35)	6(30)		
age	17.03±3.56	17.26±3.28	$t=-0.284$	0.657
degree of education[n(%)]			$X^2=0.813$	0.598
undergraduate	14(70)	15(75)		
Postgraduate	6(30)	5(25)		
body mass index(kg/m ²)	25.78±2.88	26.14±3.52	$t=0.584$	0.596

3.2. Comparison of Biochemical Indicators of the Two Groups of Subjects

After the combined intervention of group 1, the body mass index, four items of blood lipids, triglycerides and total cholesterol of the subjects showed a downward trend compared with those before the intervention, and the difference was statistically significant ($p < 0.05$). Not only that, compared with another group of subjects, the subjects after the intervention showed a significant downward trend in various indicators including glycosylated hemoglobin, fasting blood glucose and systolic blood pressure, and the difference was statistically significant ($p < 0.05$). The comparison of specific indicators is shown in Table 2.

Table 2. Comparison of the basic conditions of the two groups of experimental subjects

Related Indicators	1 group (n=20)		2 group (n=20)	
	Before intervention	After intervention	Before intervention	After intervention
Weight (kg)	74.96±14.17	71.08±11.28	72.34±12.91	70.55±11.27
body mass index(kg/m ²)	25.78±2.88	23.13±2.54*	26.14±3.52	25.38±3.06
the waist (cm)	82.23±7.85	80.23±7.29	81.44±7.21	80.87±7.18
Waist hip ratio	0.82±0.06	0.80±0.05	0.84±0.05	0.83±0.05
systolic pressure(mmHg)	130.27±14.55	127.19±14.61#	129.73±13.82	127.14±12.67
Fasting blood glucose (mmol/L)	9.58±3.55	7.16±2.38*#	9.46±3.79	8.25±2.34
glycosylated hemoglobin (%)	9.32±2.19	7.82±1.51*#	9.46±2.33	8.04±1.77
triglyceride(mmol/L)	2.36±1.54	2.13±1.05*#	2.73±1.68	2.46±1.54
total cholesterol(mmol/L)	5.59±1.38	4.37±1.41*#	5.16±1.64	4.88±1.23

Note: compared with before the intervention, * $p < 0.05$

4. Discussion on Experimental Results

With the rapid development of economy, residents' lives have been steadily improved, which has prompted the further transformation of people's dietary structure. However, at present, many factors such as unreasonable dietary structure, excessive sugar intake, and long-term intake of high-calorie foods have led to the increasingly prominent problem of overweight and obesity, which has caused related diseases including diabetes and hypertension. It increases the risk of heart disease, colorectal cancer and other diseases, which greatly affects the health of residents. Relevant studies have shown that scientific intervention for people with overweight or obesity problems with a healthy lifestyle can help the above groups lose weight, effectively lower blood sugar, and help them prevent diabetes and other diseases. It can be seen that it is of great practical significance to strengthen dietary intervention for obese people. In other words, dietary interventions can help obese patients improve their blood sugar levels and overweight problems.

It is undeniable that if you eat too much carbohydrates, the excess glucose will be decomposed, which will be converted into fat and stored in the body, which can easily induce obesity. In fact, as a dietary control method, the carbohydrate exchange method has the advantages of being simple, easy to implement, easy to master, and it has a good curative effect. In view of this, this paper uses the carbohydrate exchange method to intervene in the experimental subjects who are overweight or obese. The results show that the carbohydrate exchange method is beneficial to reduce the body mass index, blood glucose level and other related indicators, which is consistent with the existing literature research results. Based on the comprehensive evaluation of 40 overweight or obese school students, this experiment reasonably limits their daily carbohydrate food intake according to the actual situation of the subjects, and guides the experimental subjects to achieve dietary diversification and dietary balance by improving their dietary structure. In this way, the hunger of the subjects was further reduced and the balance of postprandial blood glucose was better maintained. Moreover, the intake of appropriate

vitamins and dietary fiber can help to promote the excretion of triglycerides and total cholesterol, and then reduce the blood lipid level of obese people.

Compared with the 20 subjects who received the simple intervention, the subjects who received the combined intervention had significantly lower body mass index, fasting blood glucose, systolic blood pressure and other related indicators, and their overweight and obesity levels were greatly improved. That is, by precisely limiting carbohydrate intake, it can help maintain ideal body weight and improve blood sugar levels. However, considering that the results of this experiment may be affected by the sample size and the particularity of the experimental population, it is necessary to further expand the sample size for re-verification in the later stage, so as to provide strong support for related research.

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