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ARTICLE

Improvement of Regular Exercise on Diabetes Condition of Type II Diabetes Mellitus Elderly Patients

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ABSTRACT

To investigate the effects of 12-week old aerobics and brisk walking exercise on type II diabetes in elderly patients with illness condition, at the same time, after intervention 12 months later, the subsequent movement of patients in the intervention group were followed up, in order to provide a simple and effective, scientific and reasonable exercise prescription for elderly patients. Subjects were selected according to the standard, the sex ratio of 1:1 from 28 over the age of 60 elderly patients with type II diabetes (male and female 14 each), and divided them into intervention group and control group, the control group lived a normal life (without regularity, fitness behavior during the experimental period), the intervention group did aerobics plus walking exercise intervention, two groups of patients were assessed indexes of diabetes before and after the intervention. After 12-week exercise intervention, blood glucose and cholesterol of intervention group decreased significantly, the illness condition of them had improved effectively, while the control group had no obvious change before and after the experiment, after intervention 12 months later, over 85% elderly patients of the intervention group had been in good behavior habits of fitness. Aerobics and walking exercise can improve the illness condition of elderly patients with type II diabetes to a certain extent, think that the old aerobics and rope skipping is a kind of effective and simple fitness behavior, should be targeted according to the condition of patients and health promotion.

1. Introduction

With the acceleration of population aging process, diabetes has been widely prevalent in the world. According to the WHO, the number of diabetic patients increased from 125 million in 1995 to 171 million in 2000, and it is predicted that the number will reach 366 million in 2030 [1]. Currently, China has 113.9 million diabetics. Due to the significant decline in the level of physical activity in the elderly population, the incidence rate is increasing year by year, and the trend is gradually becoming younger and younger. Account for 80 to 90 percent of the total number of diabetes patients belongs to Type Ⅱ diabetes (T2DM) patients, the vast majority of which occur in adults. Diabetes mellitus is characterized by a long course of disease, complex treatment methods, numerous complications and serious health hazards, which seriously has affected the quality of life of patients greatly [2]. Elevated blood

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glucose is the main basis for the diagnosis of diabetes mellitus, and its core index is HbA1c. The occurrence, development and recurrence of T2DM mellitus are highly related to emotion, living environment, obesity, lack of exercise, diet and heredity. The etiology of T2DM is unknown. Heredity is a major factor, but a more important factor is living environment.

A large number of studies have proved that regular exercise has a positive effect on the prevention and improvement of T2DM [3]. Long-term aerobic exercise as an effective means of T2DM intervention has been widely recognized [4-5]. Experts have believed that such a high prevalence of diabetes and such a rapid growth rate are mainly caused by the improvement of material levels and lifestyle changes, especially with the excessive intake of foods such as high fat, high sugar and high salt and lack of physical activity. In this study, the combination of geriatric aerobics and brisk walking exercise was used to conduct exercise intervention for the elderly patients with T2DM, in order to effectively improve the condition of the patients and improve the quality of life.

2. Materials and Methods

2.1 Subjects

The method of recruitment was adopted among the elderly in the urban community, and the unqualified elderly were eliminated. Finally, 28 elderly (T2DM) patients were selected. Inclusion criteria: (1) Urban community residents, aged 60-80, who are required to have no fitness habits. (2) Fasting blood glucose is stable in the range of 7.0-16.7 mmol/L, and the course of disease is 5-10 years. (3) have certain listening, speaking, reading and writing ability; (4) dietary control (such as low salt, low fat and low sugar diet) or oral hypoglycemic drugs; (5) No serious diabetes complications, no liver, kidney and other organ function damage, blood pressure is less than 180-105mmHg, ECG examination is normal; (6) Can adhere to 12 weeks of moderate intensity fitness exercise, volunteer to participate in the intervention experiment project. According to the inclusion criteria, a total of 28 elderly patients with T2DM were enrolled, including 14 males and 14 females. The subjects were randomly divided into intervention group and control group. A medical examination should be performed before exercise to rule out contraindications. To ensure that their physical health status can complete the experiment, screening exercise intervention objects. Understand the living habits, daily diet, medication and exercise habits of the subjects. Explain the purpose of the study, the duration of the study, the content of the study, the matters needing attention for exercise and the requirements for patients' cooperation to the study subjects, and obtain their informed consent and signature.

2.2 Main Test Indexes and Instruments

Main test indexes: Main evaluation indexes of diabetes mellitus: blood glucose, serum triglyceride, serum total cholesterol, serum low density lipoprotein, serum high density lipoprotein, glycosylated hemoglobin, etc. Professional testing equipment: Blood glucose was determined by glucose oxidase (GOD) method, TC, TG, HDL-C and LDL-C were determined by Beckman matching reagent, and the automatic biochemical analyzer of Beckman CX4CE was performed.

2.3 Implementation Method of Exercise Prescription

According to the test results, the disease status and physical function status of the intervention objects were mastered, and individualized exercise prescription was given in combination with the personal lifestyle to implement the exercise intervention program. (1) Sports: geriatric aerobics and brisk walking; (2) Exercise intensity: warm-up activities for 10 minutes are conducted first, followed by self-made aerobics for about 25 minutes. During exercise, the subjects' heart rate is maintained between 110 times /min and 130 times /min. During exercise, the subjects' heart rate changes are monitored regularly, and the intensity can be controlled according to their physical conditions during brisk walking. (3) Exercise time: exercise for about 1 hour and 20 minutes each time, namely 10 minutes of warm-up activities, 30 minutes of geriatric aerobics exercises, 20 minutes of brisk walking after 10 minutes of rest, and the finishing activities for the last 10 minutes. (4) Exercise frequency: three times a week. Actually speaking on Monday, Wednesday and Friday, one hour after breakfast. The intervention experiment lasted for 12 weeks in total. (5) Exercise location: it is located in a rented activity room of nearly 200 square meters to ensure the safety and effectiveness of subjects' exercise. In addition, according to the research results of Zhou Yurong et al., patients in group A suffered from 7.0 mmol/L≤FPG<10.0 mmol/L, patients in group B 10.0 mmol/L≤FPG<14.0 mmol/L, and group A reached the peak of insulin 2 hours later. The peak of insulin in group B was 3 h postprandial [3]. According to the American Physical Fitness Association's recommendation of "not exercising during insulin peak", this study decided to start intensive exercise 1 hour after breakfast to avoid hypoglycemia.

2.4 Statistical Methods

SPSS23.0 software package and Microsoft Excel2003

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software were used for statistical processing. The significance test of mean ± standard deviation was used as Independent-Sample t test, and the numerical variables were expressed as M±SD. The analysis methods included repeated measurement analysis of variance and simple effect analysis. The significant level was P<0.05, and the very significant level was P<0.01.

3. Results

The results have shown that exercise intervention stimulated the decrease of blood glucose, blood lipid, cholesterol and other indexes in the elderly urban patients with T2DM mellitus to varying degrees, and played a positive role in improving the condition of the elderly patients.

3.1 Changes of Blood Glucose Before, at Week 4 and at Week 12 in the Two Groups

A 2×3 repeated measure ANOVA was performed on the blood glucose of the patients. Intergroup factors were groups, i.e., the intervention group and the control group; intra-group factors were time, i.e., before intervention, the fourth week of the experiment, and the twelfth week of the experiment; interaction was group × time. The results showed that the group main effect was significant (F value (1,26) =4.89, P<0.05), the group main effect was significant (F value (2,52) =12.38, P<0.001), the interaction between the two was significant (F value (2,52) =11.09, P<0.001). Further simple effect analysis showed that no significant difference was found between the experimental group and the control group (P>0.05) when tested before and after the fourth week of the experiment, but after the twelfth week, the intervention group (M±SD) blood glucose index was significantly lower than the control group (F value (1,26) =21.03, P<0.001; With the passage of test time, the blood glucose of the intervention group was gradually decreased, and the difference was very significant (P<0.001). In contrast, blood glucose in the control group did not change over time (P>0.05) (Table 1).

Table 1. Changes of blood glucose, triglyceride, cholesterol, high density lipoprotein and low density lipoprotein in two groups at different test time (M±SD)

3.2 Changes of Triglyceride before, at week 4 and at week 12 in the Two Groups

A 2×3 repeated measure ANOVA for triglycerides showed that the main effect and interaction between group and test time were not significant (P>0.05) (see Table 1). The experiment results show that the intervention group of triglyceride levels at the time of intervention in the 4th week fell slightly, but with the experiment before there is no significant difference (P>0.05), perhaps because not enough exercise, shorter reasons of intervention, and to intervene in 12 weeks, before and after the experiment compared with significant difference (P<0.05), the deeper reason remains to be further explored. There was no significant difference in the control group before and after intervention (P>0.05).

3.3 Cholesterol Changes in the Two Groups at Different Test Time

A 2×3 repeated measure ANOVA for cholesterol showed significant group main effect (F value (1,26) =8.93, P<0.01), significant intra-group main effect (Fvalue (2,52) =48.92, P<0.001), significant interaction between the two (Fvalue (2,52) =56.05, P<0.001). Further simple effect analysis showed that there were significant differences between the intervention groups before, in the 4th week, and in the 12th week (P<0.001). Cholesterol levels

index	group	Before the experiment	The fourth week	The twelfth week
Blood glucose	intervention group(n=14)	8.54±1.98	8.20±1.64	6.86±1.04**
	Control group(n=14)	9.21±1.87	9.10±1.53	9.13±1.53
Triglyceride	intervention group(n=14)	2.44±1.08	2.36± .94	2.01± .72*
	Control group(n=14)	2.28±1.10	2.34±1.14	2.31±1.18
Cholesterol	intervention group(n=14)	6.52± .47	6.01± .49	4.80± .69**
	Control group(n=14)	6.38±.80	6.46±.72	6.32± .76
High density lipoprotein	intervention group(n=14)	2.09± .61	2.01± .49	2.05± .24
	Control group(n=14)	1.98± .68	1.96± .62	1.90± .68
Low density lipoprotein	intervention group(n=14)	3.32±.85	2.95±.76	2.18±.75**
	Control group(n=14)	3.30±.68	3.04±.67	3.07±.68

*Notes: the experimental data of this study, * indicates significant difference P< 0.05; * * indicates significant difference (P<0.01)*

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in the intervention group were significantly lower than those in the control group in the 12th week (F (1,26) =8.32, P<0.001). As the test time went on, the cholesterol of the intervention group was gradually decreased, and the difference was significant (P<0.001). In contrast, cholesterol in the control group did not change over time (P>0.05) (Table 1).

3.4 HDL Changes in the Two Groups at Different Test Time

However, a 2×3 repeated measure analysis of variance on HDL showed that the group main effect, the intra-group main effect and their interaction were not significant, P>0.05 (Table 1). The reason remains to be further studied.

3.5 Changes of LDL in Two Groups at Different Test Time

A 2×3 repeated measure analysis of variance for low-density lipoprotein showed that the group main effect was not significant (F value (1,26) =3.35, P> 0.05), the group main effect was significant (F value (2,52) =17.30, P< 0.001), the interaction between the two was significant (F value (2,52) =18.57, P< 0.001). Further simple effect analysis found that the intervention group showed a downward trend in the indicators before, in the 4th week, and in the 12th week, and all reached very significant differences (P< 0.001). At the twelfth week of the experiment, low density lipoprotein index of the intervention group (M±SE) was significantly lower than that of the control group, F value (1,26) =16.22, P< 0.001; However, the control group did not show a decreasing trend over time (P> 0.05) (Table 1).

4. Analysis and Discussion

T2DM is a chronic disease that cannot be cured totally with medicine. Once diagnosed, it is necessary to take drugs or inject insulin for long-term blood sugar control. Not only to the patient's body damage, but also more heavy psychological pressure. However, after regular physical exercise, the blood sugar of patients decreases and their condition improves. Such favorable results can greatly enhance the confidence of patients to overcome the disease and improve their sense of self-efficacy. Meng En (2014) pointed out that T2DM patients should keep fit 4-5 times a week, with 30-120 min of exercise for at least 30 min of effective intensity for each exercise, and the best effect would be achieved 1 hour after meal [4]. Now exercise therapy has been proved to be a scientific and effective treatment for T2DM diabetes. Patients with appropriate intensity aerobic exercise can effectively reduce weight, improve the organism of insulin sensitivity, promote the body metabolism, improve the function of the respiratory and circulatory system, enhanced physique, vital capacity increases, the prevention of diabetes complications, and can also cultivate life interest, edify sentiment, reduce stress, improve the quality of life [5].

When a person is convinced that he or she is capable of performing a certain activity and gains a certain amount of income, he or she will develop a high sense of self-efficacy and take the initiative to carry out the activity, in order to achieve effective control of the development of disease, improve the quality of life. Research in related fields at home and abroad also shows that in the course of treatment of various chronic diseases, patients' self-management ability can be enhanced by enhancing their confidence and self-efficacy, patients actively engage in an activity when they see that the behavior is beneficial to the body and the disease. The experimental results are in good agreement with those of collar [6] et al. More than 12 weeks of moderate intensity aerobic exercise has been proven to be effective in improving glucose metabolism. However, other studies [7] have shown that younger age diabetics under the age of 55 are more sensitive to exercise, and aerobic exercise is less effective in lowering blood sugar in older age patients. Wang Zhengrong [8]believes that nearly 90 percent of diabetic patients have a significant drop in fasting blood glucose after one year of exercise intervention, suggesting that as long as people develop good fitness and exercise habits and exercise more than three times a week or every day, it would have a better effect. The control group had no significant changes in blood glucose and other indicators before and after the experiment, which showed that without regular aerobic exercise intervention, only control of Diet and medication, lack of better effect on the decline of Blood Glucose and other indicators of diabetes, [9] the research of Tao lingling and others has similar results. Exercise intervention therapy is as important in the treatment of Type II diabetes as Diet Control and drug therapy, exercise therapy plays an irreplaceable role in clinical practice, which should be paid more attention to by the medical field and patients [9].

Duan Yanping (2012) believes that the subject can actively adhere to at least three times a week or engage in moderate intensity fitness behavior every day for more than 12 months, and to some extent has formed good habits and lifestyle of regular fitness behavior [10]. When the elderly have participated in fitness activities, their physical and mental self-perception is very important, that is to say, the so-called self-efficacy. The theory of self-efficacy refers to an individual's expectation of whether he or she

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has the ability to implement a certain behavior, which is people's cognition and evaluation of their own behavioral ability. High levels of "self-efficacy" occur when people believe they are capable of performing an activity, and self-efficacy is at the heart of the self-regulatory system. According to this theory, human behavior is affected by external reinforcement and self-reinforcement, but no matter which reinforcement affects behavior through affecting self-efficacy. Therefore, in the process of exercise, when the old master certain exercise skills, after a period of time after fitness law, to see their physical and mental status changes, will generate more intense internal training motivation, fitness behavior internalizes for own life habits and way of life, to form a long-term mechanism for fitness, regular exercise and self-efficacy form benign interaction each other, promote each other. Regular exercise has a good effect on regulating the endocrine cycle of the elderly, improving physical function, reducing loneliness and depression, making the elderly feel comfortable, increasing communication, enhancing the awareness and ability of social participation, and thus effectively improving the quality of life of the elderly " [11]. At the end of the campaign experiment after 12 months, has carried on the track to intervention group respectively, there are 12 people in the middle of the 14 people have still insisted to do elderly in setting-up exercise and brisk walking exercise, regular exercise behavior accounted for 85.7%, some old people in addition to do these movements, walks fast and physical exercise, tai chi or other projects to exercise time also increased a lot than during the experiment, basically exercise every day, time in 1-2 hours, more than clinical recommendations weekly exercise time, fully demonstrated the exercise intervention experiments good follow-up effect, It has also shown that the music aerobics created by the elderly patients has a strong entertainment, brisk walking also stimulated the patients' interest in exercise, these two exercises are simple and easy to do, scientific and effective, and also play an important role in promoting the elderly T2DM patients' adherence to fitness behavior [12].

4. Conclusions

Applying 12 weeks' old-age geriatric aerobics and brisk walking intervention to the elderly patients with T2DM can effectively stimulate the patients' body, make their blood sugar, blood lipid, cholesterol and other indicators decline to varying degrees, and play a positive role in improving the condition of the elderly patients. Therefore, the research conclusion has shown that under the premise of clinical treatment, applying regular and scientific exercise intervention to elderly patients with T2DM has a very good adjuvant treatment effect on improving their condition, and can effectively improve their quality of life, so it is recommended to promote it vigorously.

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