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Effects of Exercise and Diet Intervention on Serum Lipid Level in Patients with Hyperlipidemia

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Keywords: Exercise Intervention, Dietary Interventions, Hyperlipidemia Patient, Non-drug Therapy

Abstract: Objective: To investigate the effect of exercise and diet intervention on blood lipid level in patients with hyperlipidemia. Methods: 680 patients with hyperlipidemia were detected from 5200 physical examiners, 566 patients were screened and randomly divided into intervention group and control group, each of which was 283 cases. The intervention group received reasonable diet and exercise guidance and weekly follow-up supervision. The control group did not perform the above intervention and did not take lipid-lowering drugs. And 6 months after the start of the observation period to observe the expiration of the enzymatic determination were used respectively in the blood triglyceride (TG), total cholesterol (TC), low density lipoprotein (LDL -C), high density lipoprotein (HDL -C), total cholesterol and the ratio of high density lipoprotein cholesterol (HDL -C), low density lipoprotein and the ratio of HDL levels of change, and statistical analysis. Results: In the intervention group, TG decreased from (2.94±0.49) mmol/L to (2.16±0.83)mmol/L, TC decreased from (6.58±0.42)mmol/L to (5.21±0.39)mmol/L, and LDL-C decreased from (4.42±0.36) mmol/L to (3.38±0.31) mmol/L. Conclusion: Diet and exercise can effectively improve the level of blood lipid in patients and can be used as non-drug therapy for patients with hyperlipidemia.

1. Research background

Hyperlipidemia is a common clinical disease, and its incidence in China is increasing year by year [1]. With the aging of the global population, hyperlipidemia has become a topic of common concern in the contemporary medical community, and various countries and regions have invested a lot of manpower and financial resources in prevention and treatment research and rehabilitation intervention [2]. Due to the lack of typical clinical symptoms in the early stage of hyperlipidemia,

many people do not pay attention to early diagnosis and early treatment, and the damage to the body is hidden, progressive and systemic[3]. Medicine advocates comprehensive treatment, without serious complications, such as general can by changing the way of life first, such as a low-fat diet, exercise, quit smoking early thousands of pre-treatment, according to the control of conditions on the basis of this choice drug therapy, dialysis therapy, surgical therapy and gene therapy, etc., but still is given priority to with drug therapy [4]. From a clinical perspective, long-term drug use has different degrees of side effects, and once the drug is stopped, it is easy to rebound, which makes the treatment of hyperlipidemia become embarrassing, and brings mental burden to the patients [5]. If long-term treatment, the patient's compliance is poor, will inevitably affect the efficacy. Therefore, it is necessary for us to explore the prevention and treatment methods that are convenient, inexpensive, safe, effective and easy to popularize [6].

The pathogenesis of hyperlipidemia can be divided into primary and secondary, and the latter is secondary to other diseases, such as diabetes, nephrotic syndrome, hypothyroidism, obesity, alcoholism, pancreatitis and gout [7]. Primary hyperlipidemia refers to hyperlipidemia with unknown causes. Currently, it is believed to be related to two major factors, environment and heredity, and in most cases it is the result of the interaction between the two [8]. Hyperlipidemia refers to the abnormal increase of one or more lipids (mainly TC and TG) in the blood. Studies have found that age is positively correlated with the concentration of blood lipid (TC, TG, LDL-C) [9]. Hyperlipidemia is prone to occur in middle-aged and elderly people, and it has become one of the important factors that harm the health of middle-aged and elderly people [10]. Research on the relationship between cholesterol and atherosclerosis began in the early 20th century, and a large number of data on the relationship between blood lipid and atherosclerosis and coronary heart disease have been accumulated. It has been confirmed that hyperlipidemia, especially the increase of serum TC and LDL-C, and the decrease of HDL-C are the main risk factors for coronary heart disease [11]. Studies have shown that when the fasting serum TC concentration increased from less than 1.8g/L(4.7 mmol/L) to more than 2.6g/L(6.7mmol/L), the incidence of myocardial infarction increased from 1.7% to 6.4%[12]. In the population with plasma TC concentration greater than 2g/L(5.2mmol/L), a 1% increase in plasma TC concentration was associated with a 2% increase in the incidence of myocardial infarction. Many large-scale epidemiological investigations have confirmed that the mean serum TC of the population has a significant positive correlation with the proportion of total dietary fat and saturated fatty acids in energy. Other studies have shown that dietary saturated fatty acids, especially C120 and C140, have a very strong effect on serum TC and LDL-C. According to the investigation data in China, when the consumption of animal food and fats increases, the energy provided by fat increases by 5%, and the average blood cholesterol level of the population increases by 10%. Intake of high-cholesterol diet is the main determinant of serum TC rise, and 30% ~40% of the cholesterol in human towel comes from exogenous sources, that is, directly from food. Therefore, in the prevention of hyperlipidemia, diet control has a very important position, in the general population; diet treatment is the most basic measure to control dyslipidemia.

2. Theoretical Basis

Most of the causes of hyperlipidemia are unknown, and most of them are believed to be caused by a combination of genetic defects and environmental factors, including: poor diet, insufficient physical activity, obesity, increased age, smoking, alcohol and so on. In view of the above causes, the treatment measures for hyperlipidemia are comprehensive, including comprehensive non-drug intervention therapy change and drug treatment, among which non-drug intervention therapy is the primary basic treatment measures, divided into reasonable diet and strengthens the exercise of the treatment measures.

2.1. Dietary Intervention

Reasonable diet is an important measure in the prevention and treatment of hyperlipidemia. Long-term high cholesterol, high saturated fatty acid diet, can make the blood TG and TC increase, thus atherosclerosis, hypertension, diabetes, etc. The results show that the dietary structure of Chinese residents is unreasonable, in which the consumption of animal meat and lipids is excessive, while the consumption of cereals is low. Due to the intake of saturated fatty acids and cholesterol, the prevalence of hyperlipidemia gradually increases. Reasonable dietary structure can regulate blood lipid, to prevent stroke, coronary heart disease and other cardiovascular and cerebrovascular diseases. Dietary control can promote the reduction of TG and TC levels. Application of hyperlipidemia patients of lipid-lowering medications at the same time control the diet can strengthen the role of lipid-lowering drugs, combined use of cholesterol-lowering diet and medication, observed patients serum TG, TC extent effect is more obvious than when cholesterol-lowering drugs alone, this kind of circumstance suggests simple diet control to a certain extent, can effectively reduce the blood level of TG, TC. The reduction of serum TC is of great significance for the prevention and treatment of coronary heart disease. Studies have shown that for every 1% reduction of serum TC, the risk of coronary heart disease can be reduced by 2%. Reasonable adjustment of dietary structure, reduce the intake of saturated fatty acids and cholesterol in the diet, increase the intake of monounsaturated fatty acids or polyunsaturated fatty acids, can also reduce serum TC. Although the serum TC level and dietary fat intake of Chinese population are still lower than those in the United States and other western countries, the dietary cholesterol and fat intake of Chinese population are still correlated with the serum cholesterol level. Therefore, when carrying out dietary control, should actively advocate reducing the intake of saturated fatty acids, as far as possible to use vegetable oil containing unsaturated fatty acids.

2.2. Exercise Intervention

Exercise intervention is another important means of non-drug treatment of hyperlipemia, in a lot about the treatment of hyperlipidemia, exercise intervention to obtain better treatment effect, and the movement of hyperlipidemia avoided many of the side effects of drug treatment intervention, its therapeutic effect is superior to the simple diet control, and the implementation of easy and cost effective has the superiority of drug therapy and diet than not. Study sustainability movement for a long time can reduce blood TC, LDL lowering, increasing HDL, HDL2 - C increases, and TG/HDL and LDL/HDL ratio drops, TC after exercise for a long time by 5% ~ 7%, HDL - C average increased by 10% ~ 25%, HDL - C including HDL2 and HDL3 C - C, HDL2 C larger molecules, contains more cholesterol ester and apoE, and liver cells HDL - C receptor was removed, thus have the AS resistant. Studies have shown that exercise can increase hdl2-c by up to 17.1% ~30%. The reason for the increase in HDL is reduced clearance, because the HDL half-life after exercise is extended from 3.8d to 6.2d. Exercise can reduce plasma ll-c by about 5%~18%, while overloading exercise can increase LDL-C. Studies on the effect of exercise on TG have shown that long-term aerobic exercise can improve the activity of antioxidant enzymes in body tissues and blood, reduce the concentration of lipid peroxides, and affect lipid metabolism to prevent the occurrence of AS. It reduces the incidence of coronary heart disease, AS and hypertension, improves the health of patients and prolongs their life.

3. Experiment

3.1. Research Object

680 patients with hyperlipidemia were detected from 5200 physical examiners, and 566 patients (serum triglyceride level ⩾1.71mmol/L) were randomly divided into the intervention group and the control group, each with 283 patients. Among them, there were 296 males and 270 females aged 40-60 years with an average age of 47.2+7.1 years. Inclusion criteria:

(1) All the objects are han and light manual workers;

(2) Senior managers of the company, administrators of public institutions or retired cadres;

(3) Patients with no other serious diseases who met the diagnostic criteria for hyperlipidemia (serum triglyceride level ⩾1.71mmol/L);

(4) Not using lipid-regulating drugs and related health products;

(5) All the patients had quit smoking for 1 year, and the dietary pattern was the same as usual;

(6) Volunteer for the study.

Exclusion criteria: (1) Age less than 40 years old or older than 60 years old;

(2) The serum triglyceride <1.71mmol/L did not meet the diagnostic criteria for hyperlipidemia;

(3) Severe infection and serious infectious diseases;

(4) Malignant tumor and AIDS;

(5) Dysfunction of other organs (excluding kidney);

(6) Smoking cessation <1 year, irregular dietary patterns:

(7) Refuse to join the researcher.

The subjects were randomly divided into the intervention group (283 cases) and the control group (283 cases) using a random table.

3.2. Laboratory Index Acquisition

(1) Blood sample collection: 3mL of fasting elbow venous blood was collected in the morning after fasting for 10-12h.

(2) Determination of blood lipid: the changes of total blood cholesterol (TC), low-density lipoprotein (TG) and triglyceride (LDL-C) were determined by enzymatic method. According to the diagnostic criteria of dyslipidemia in Chinese guidelines for the prevention and treatment of adult dyslipidemia (2007), TC ⩾ 6.22 mmo1 / L, TG ⩾ 2.26 mmol/L and LDL-C ⩾ 4.14 mmol/L were elevated. The selected subjects were not medicated.

3.3. Experimental Plan

The intervention group and the control group adopted different experimental plans. Control group: only the results of written physical examination and health advice were given, without special intervention of the following measures. The observation period was 6 months, during which no lipid-lowering drugs were taken. Intervention group: non-drug intervention for hyperlipidemia, including:

(1) Dietary guidance

According to the individual's eating habits, the individualized dietary guidance was formulated on the basis of the reasonable dietary structure of low-fat, low-sugar, low-salt and multi-vitamin. Principles: control total energy, limit fat diet, adequate vitamins, minerals and food fiber, and reduce cooking oil. Cooking methods as far as possible to avoid frying, frying or stir-frying, can use steaming, boiling, stew, pot, baking and other methods. In terms of energy intake, normal weight and overweight people had daily caloric control of 25kcal/kg, while obese people had daily caloric

control of 20kcal /kg. Protein accounted for 20%, total fat for 25%, carbohydrate for 55%; Saturated fatty acids, polyunsaturated fatty acids, monounsaturated fatty acids according to the recommended amount of Chinese nutrition society, control the appropriate range of 1:1:1; Cholesterol <200mg/ day.

Daily specific dietary control plan: grain and cereal 250g, choose rice, noodles, cereals, etc.; Meat ⩽30g, choose lean meat, beef, mutton, etc., avoid fat meat, processed meat products (sausage), fish roe animal viscera, etc.; Poultry meat category 25g, choose skinless chicken, duck, etc. Egg and its products 35g, choose eggs, duck eggs, egg white; Milk and its products 200ml, choose milk, yogurt, etc., not whole milk powder, cheese and other dairy products: fat 25g, try to choose vegetable oil, such as peanut oil, soybean oil, sunflower oil, mixed oil, avoid eating lard, beef oil, etc.; Granulated sugar <7g; Fresh vegetables do not need to limit, 400 to 500 grams per day, dark green leafy vegetables or red and yellow vegetables; 250g fresh fruit, avoid processed fruit juice and fruit-flavored drinks; Beans and its products 25g, such as soybean, tofu, bean products, etc.; Seafood 75 g; The above-mentioned daily food is divided into three meals according to the proportion of 1/5, 2/5 and 2/5. Additional need is drinkable water, need to drink water daily 2000ml above, can choose plain boiled water, mineral water, green tea to wait.

(2) Exercise prescription

According to different sports hobby and the combination of individual actual situation to give sports prescription. Principle: individual exercise, advocate moderate intensity aerobic exercise, and follow the four principles of aerobic exercise, namely step by step, for each individual, comprehensive development, perseverance.

Methods:

1) According to the physical examination results to choose suitable aerobic exercise, for the middle-aged patients with a strong body, choose sports with greater intensity, such as swimming, running, riding a bicycle, climbing, playing badminton, shuttlecock, etc.; For the weak middle-aged and elderly patients, the appropriate choice of the intensity of the project, such as walking, exercise, etc.

2) The exercise intensity can reach 120~130 times /min by pulse, or the number obtained by subtracting the actual activity from 170 is the number of pulse reached by exercise. It is suitable for fatigue to gradually disappear in 10-20min, and the time is generally no less than 30minl28, and more than 3 times per week. A special person is responsible for organizing, recording and supervising the work.

At the beginning of the observation period and at the end of 6 months, each participant was organized to answer the questionnaire of knowledge of dyslipidemia. The questionnaire was self-filled and was completed face to face by investigators with unified training to calculate the knowledge rate of dyslipidemia. The exercise frequency and time of subjects were counted once a week, and the average number of active exercise per week was calculated. Diet information is registered once a week. Lipid profile and BMI were measured at the beginning of the study and at 6 months. Methods: the experimental values of TC, TG and HDL-C were determined by blind method with automatic biochemical analyzer in the same laboratory. Body mass index (BMI)= body mass (kg)/ height *(m2).

3.4. Quality Control and Statistical Analysis

1) Do all the preparatory work before the blood drawing to prevent mistakes caused by the confusion and make a record for checking.

2) In the measurement of body indicators, the tools used are calibrated first and measured by the same person to reduce errors.

3) In the laboratory work, under the same laboratory conditions, the same experimenter shall operate the case number, the name and the number shall correspond, and the quality control shall be done.

4) All data were input into the computer for analysis, and the data were re-checked to ensure the accuracy of input.

SPSS 18.0 statistical software was used, and the measurement data was expressed as mean ± standard deviation ($x \pm s$). T test and multiple linear regression method were used for statistical analysis, and $P < 0.05$ was considered statistically significant.

4. Experimental Results

The comparison of the observed index values of the patients before and after the intervention is shown below. It can be simply seen that the concentrations of TC, TG and LDL-C in the patients were lower after the intervention than before. The HDL-C concentration was higher than that before and after the intervention, and the difference was statistically significant ($P < 0.01$).

The comparison results of various indicators before and after intervention and between the intervention group and the control group are shown in table 1. The comparison results of TC, TG, LDL-C and HDL-C indicators are shown in figure 1.

Table 1. Comparison results of various indicators before and after intervention and between the intervention group and the control group

Indicators	Intervention group(N=283)		Control group(N=283)		P
	Before intervention	After intervention	Before test	After test	
BMI(kg/m²)	28.09±2.25	24.23±2.61	24.00±3.83	25.21±2.01	0.046
TG(mmol/L)	2.16±0.45	1.84±0.85	2.30±0.51	2.62±0.28	0.006
TC(mmol/L)	6.39±0.64	5.66±0.45	6.51±1.28	6.66±1.65	0.004
LDC-C(mmol/L)	4.23±0.71	3.27±0.47	4.37±0.76	4.67±1.39	0.005
HDL-C(mmol/L)	1.01±0.16	0.89±0.12	1.66±0.47	1.86±0.33	0.006
LDL/HDL(mmol/L)	4.96±1.09	3.90±1.62	4.24±1.42	4.27±1.8	0.004
TC/HDL(mmol/L)	6.62±1.06	5.84±1.22	6.29±1.91	4.40±0.78	0.003
TG/HDL(mmol/L)	3.95±1.17	3.03±1.37	3.98±0.82	3.24±0.59	0.007

The before-and-after results of various food intake of the intervention group and the control group are shown in table 2 below. The results of the before-and-after comparison of various food types of the intervention group and the control group are shown in figure 2 below.

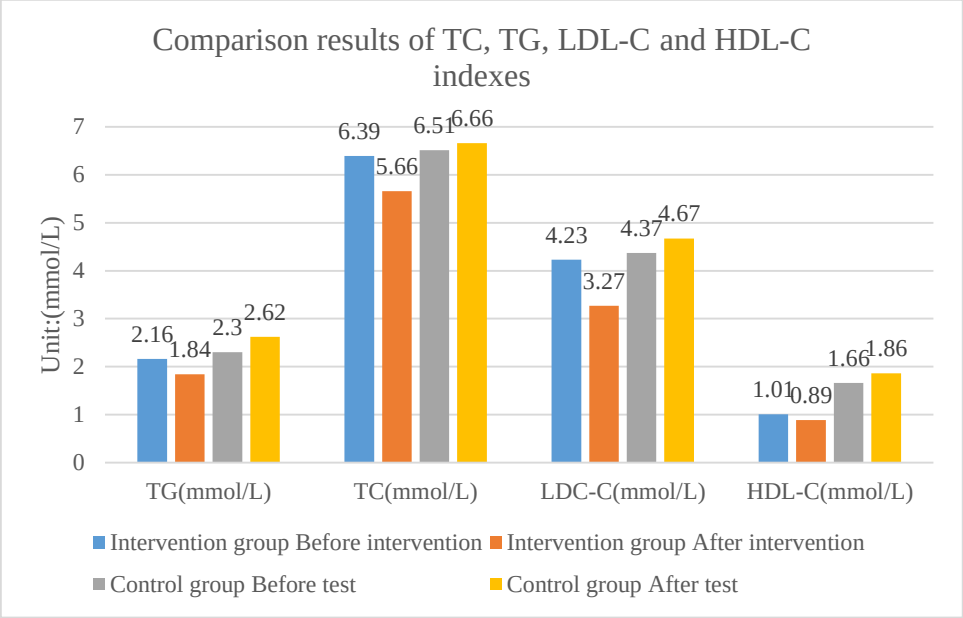

Figure 1. Comparison results of TC, TG, LDL-C and HDL-C indexes

Table 2. Before and after results of various food intakes of the intervention group and the control group

Indicators	Intervention group(N=283)		Control group(N=283)		P
	Before intervention	After intervention	Before test	After test	
Food grains	309.12±53.27	226.12±26.28	312.24±13.42	318.25±17.84	0.000
Soy products	18.58±5.21	25.83±7.35	19.24±2.64	21.56±1.43	0.000
Dairy	90.18±30.23	83.23±20.48	89.21±16.74	89.45±25.45	0.001
Eggs	80.27±10.35	49.23±16.22	74.36±27.49	78.12±22.56	0.000
Stupid	73.98±12.57	34.43±14.68	79.42±16.83	83.25±14.76	0.000
Poultry	32.64±19.24	21.78±10.43	37.24±10.74	32.46±16.75	0.000
Oil class	43.18±21.74	21.55±17.85	45.27±18.94	42.45±19.42	0.000

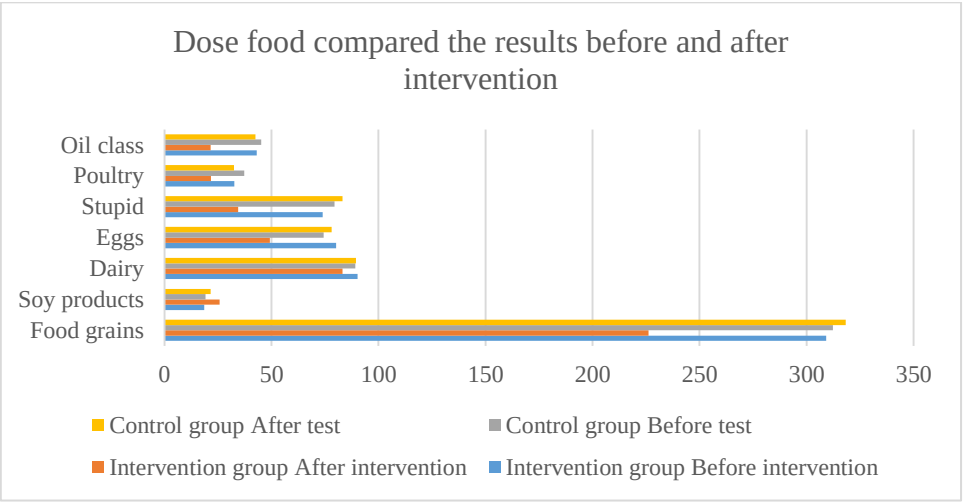

Figure 2. The intervention group and control group food varieties comparison before and after the intervention

Before and after nutrient intervention, the results of the intervention group and the control group were shown in table 3 and figure 3, respectively.

Table 3. Results of nutrient intervention before and after the intervention group and the control group

Indicators	Intervention group(N=283)		Control group(N=283)		P
	Before intervention	After intervention	Before test	After test	
Protein energy ratio (%)	24.12±2.24	18.16±3.28	25.12±2.38	24.37±3.26	0.000
Fat energy supply ratio (%)	35.24±5.16	23.35±4.18	17.12±6.26	18.92±6.82	0.000
Carbohydrate energy ratio (%)	41.16±3.28	52.19±3.29	41.19±3.28	43.26±2.25	0.000
Vitamin A (mg/day)	0.52±0.15	0.79±0.17	0.51±0.14	0.52±0.17	0.001
Vitamin B1 (mg/day)	0.76±0.21	1.38±0.38	0.75±0.22	0.85±0.21	0.000
Vitamin B2 (mg/day)	0.64±0.15	1.35±0.31	0.66±0.16	0.71±0.17	0.000
Vitamin C (g/day)	0.06±0.02	0.12±0.03	0.06±0.01	0.07±0.02	0.000
Calcium (g/day)	0.49±0.08	0.82±0.17	0.49±0.08	0.51±0.09	0.000

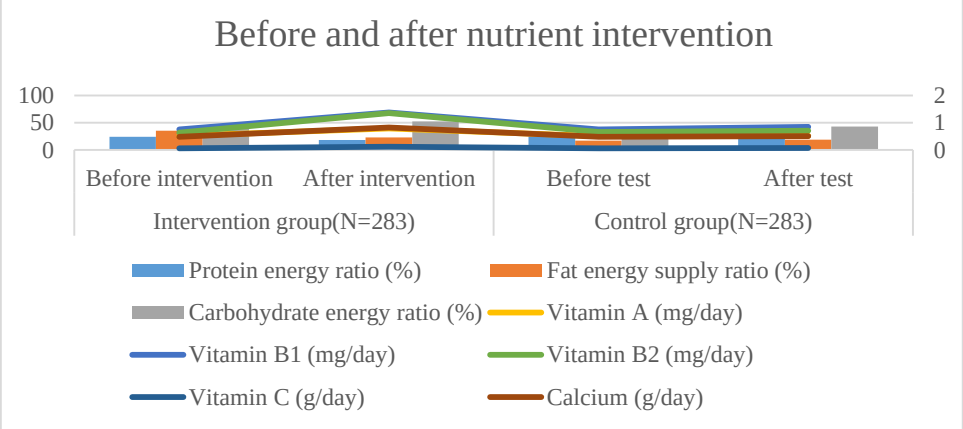

Figure 3. Before and after nutrient intervention in the intervention group and the control group

The results of the comparison of physical exercise before and after the intervention between the intervention group and the control group are shown in table 4. According to the multiple linear regression analysis, the increase of knowledge rate of hyperlipidemia, the increase of physical exercise frequency and the decrease of calorie intake were significantly correlated with the decrease of TG, TC and LDL-C, and the main factors affecting the changes of TG, TC and LDL-C were shown in figure 4 below.

Table 4. Results of physical exercise before and after intervention in the intervention group and the control group

Indicators	Intervention group(N=283)		Control group(N=283)		P
	Before intervention	After intervention	Before test	After test	
Active exercise frequency/week	2.11±0.57	3.93±0.28	0.91±0.36	1.23±0.62	0.000
Active exercise hours/week (min)	36.37±11.26	169.39±39.26	36.71±11.82	39.24±10.58	0.000
Total exercise intensity/week (Kcal)	302.17±23.75	1968.67±238.37	298.45±50.34	336.28±58.24	0.000

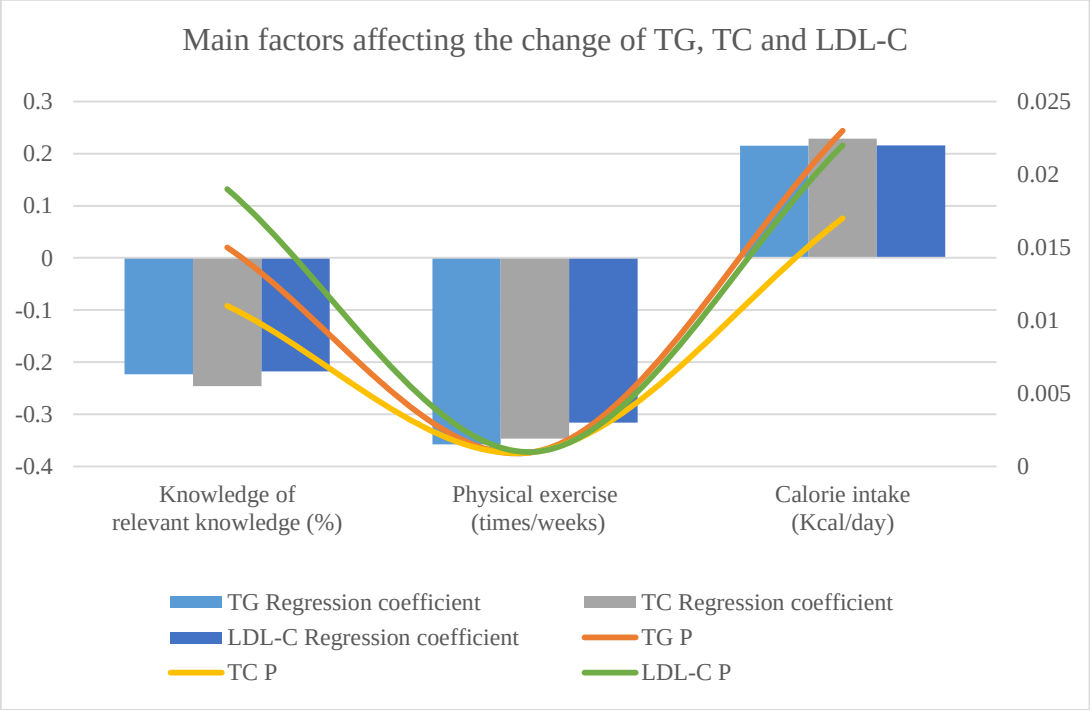

Figure 4. Main factors affecting the change of TG, TC and LDL-C

5. Analysis and Discussion

5.1 Analysis of Experimental Results

The results of this study showed that the concentrations of TC, TG and LDL-C in the patients were lower after intervention than before. The HDL-C concentration was higher than that before and after the intervention, and the difference was statistically significant ($P< 0.01$). The results showed that diet and exercise intervention could effectively improve the lipid level of hyperlipidemia patients.

Exercise and diet intervention measures can effectively control the level of blood lipid in patients with dyslipidemia and promote the development of good living and eating habits in patients with hyperlipidemia. Exercise and diet intervention measures are the basic and primary measures to control hyperlipidemia. Clinical intervention trials in recent years have shown that appropriate lifestyle changes in most patients with hyperlipidemia can have a similar therapeutic effect to that of lipid-lowering drugs, and can effectively reduce the occurrence of cardiovascular events while effectively controlling blood lipids. Exercise and diet intervention is aimed at the identified modifiable risk factors such as diet, physical inactivity and obesity, adopt active lifestyle improvement measures, for the patients with dyslipidemia has been clearly diagnosed, its content is therapeutic non-drug intervention, which is different from general health care.

The results of this study show that the health knowledge education of hyperlipidemia is not the basis of drug intervention, and the change of the object's attitude and the formation of good habits are the key. However, the publicity and education of relevant health knowledge is only the premise of the implementation method. Finally, it is necessary to implement individualized and diversified exercise programs and dietary control and other intervention methods, mobilize the initiative of patients and their families, give full play to the mutual influence of the group, and strengthen the compliance of patients, so as to achieve satisfactory results. A healthy lifestyle, namely a proper diet and moderate exercise, is necessary and effective for the prevention of dyslipidemia and for the

control and even reversal of its development. Blood lipid drop related factors analysis found that related health knowledge level was associated with a decrease in blood lipid levels, reduce calorie intake, and the rise of initiative exercise increases were significantly related to the correction of diet and exercise behavior therefore is the basis of comprehensive treatment, patients with dyslipidemia is the key to consolidate curative effect, must actively cooperate with for patients.

The results of this study showed that dietary and exercise intervention in patients with dyslipidemia could significantly reduce the level of blood lipid, which was similar to the results of relevant domestic studies. If the long-term maintenance of good diet and exercise habits can reverse the state of hyperlipidemia, some patients can avoid drug treatment. Through the research, it is found that at present, urban residents with hyperlipidemia still have little understanding of health knowledge, and insufficient understanding of the harm of dyslipidemia, so they cannot take the initiative to carry out effective intervention and control. As long as through a planned, continuous non-drug intervention, can improve the level of health knowledge of patients with dyslipidemia, fully mobilize the enthusiasm, make them establish the correct health concept, establish a reasonable lifestyle, develop a good diet and exercise habits, so as to achieve the goal of effective control of blood lipid.

Hyperlipidemia is a chronic disease with a long course, easy to repeat, and easy to occur complications, and its pathogenesis and prevention methods are closely related to daily life, diet and exercise. The occurrence of hyperlipidemia is closely related to diet, because diet is the main source of blood lipid, eating too much animal fat, will cause the increase of lipoprotein and cholesterol in blood. Long-term lack of exercise and dyslipidemia have an obvious relationship. Exercise can activate lipoprotein and lipase in skeletal muscle and adipose tissue of patients, balance and transfer HDL-C and LDL-C, reduce serum TG and free fatty acid levels, promote the decomposition of cholesterol, increase glucose tolerance, and maintain a stable healthy body quality. At the same time, the excess body fat is consumed, body mass reduction can be beneficial to reduce the concentration of LDL-C, TC, TG, and increase the concentration of HDL-C. The investigation on the health education demand of hyperlipidemia patients shows that the prevention knowledge of hyperlipidemia patients is the highest demand. Health education can improve people's knowledge and prevention of hyperlipidemia. To this end, we carry out health education for patients, so that patients understand the pathogenesis and treatment of hyperlipidemia, and ask patients to change their bad habits, drink more tea, limit alcohol, and quit smoking. Drinking more tea promotes fat metabolism and is conducive to the recovery of fatty liver. Alcohol restriction can avoid alcohol toxicity to the liver; reduce the accumulation of fat in the liver.

5.2 Discuss

At present, with the improvement of people's living standard, the public's awareness of physical examination has been significantly enhanced, and the detection rate of dyslipidemia has also been significantly increased. Most hyperlipidemia positive detection because there was no obvious self-conscious symptom, often cannot take own existence of disease, specialized subject JiuZhenLv is low, and in a medical feedback guidance, take the necessary non-pharmaceutical interventions, the majority of patients accepted more easily implemented, combined with effective follow-up and review can play an effective prevention and control effect.

The pathogenesis of hyperlipidemia is the disorder of lipid metabolism, which leads to the deposition of triglyceride in the liver and the steatosis of liver cells. The physiological mechanism of hyperlipidemia is insulin resistance. Before the intervention, the patients did not know enough about the disease and did not understand the diet treatment was the basis of hyperlipidemia. After the intervention, patients master a reasonable diet, eat a low-salt, low-fat, high-protein, high-fiber

diet, avoid overeating, food diversification, mainly cereal, and eat more fresh vegetables, fruits. Obese patients reduce calorie intake, increase aerobic exercise, reduce the risk factors of disease; Smokers can quit. After the intervention, patients can change their dietary structure scientifically and their unhealthy lifestyle can be improved. Health education is conducive to the improvement of patients' self-care ability. Through health education, patients' knowledge of disease prevention and treatment and self-care ability can be significantly improved. Epidemiological and clinical trial studies have also demonstrated that lifestyle can affect lipid levels through the interaction of certain factors.

In the process of intervention, the causes of hyperlipidemia, the role of acute cardiovascular events and the basic knowledge of the treatment of hyperlipidemia were firstly popularized to the patients, so that they could truly master the knowledge related to hyperlipidemia, establish the concept of health, and improve their self-care ability. Dietary and exercise behavior intervention effectively controlled patients' lipid levels. To control blood lipids, you need to drive a "five-horse cart" of questions: education and psychology, diet, exercise, medication and monitoring. The knowledge of prevention and treatment of hyperlipidemia should be systematically taught to those who lack knowledge of hyperlipidemia, the characteristics of the disease should be introduced to the patients and their families, so that they can have a correct understanding of the disease, explain the importance of cooperating with the medical staff for regular whole-course medication and the control of blood lipids in the normal range. Through the above measures, can effectively control the lipid in the appropriate level. The concept of health education should focus on the change of people's behavior and emphasize the unity of "knowledge, faith and action". However, because the formation of human behavior is restricted by biological, psychological, social and other factors, in many cases, people's knowledge, belief, attitude and behavior are not fully coordinated. Therefore, the work of health education should overcome the blindness of pure education, analyze and understand the factors affecting people's health behavior by using modern health education theory, and help the object of education to establish confidence and overcome difficulties, so as to consciously adopt healthy behavior.

6. Conclusion

(1) Exercise and diet intervention measures can effectively control the level of blood lipid in patients with hyperlipidemia, and promote patients with hyperlipidemia to develop good living and eating habits, which can be used as a non-drug treatment method for patients with hyperlipidemia.

(2) The health knowledge education of hyperlipidemia is the foundation of non-drug intervention, and the change of the object's attitude and the formation of good habits are the key.

(3) Among several factors affecting the change of TG, TC, LDL-C and HDL-C, the knowledge rate of hyperlipidemia and the number of physical exercise significantly changed after intervention, and the daily calorie intake significantly decreased, suggesting that health education, physical exercise and reasonable diet are important contents of non-drug intervention for dyslipidemia.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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