LPL rat plasma high-fat diet, the impact of research HL, ApoC Ⅱ activity sports

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Abstract. Objective To investigate the serum LPL swimming fat diet rats, HL, ApoC Ⅱ content and its effect on body weight, lipid metabolism regulation mechanism analysis of movement disorders, to provide a theoretical basis for the prevention and treatment of hyperlipidemia and its complications. Methods 30 SD male rats were randomly divided into normal diet control group (group C), high-fat diet model group (H group), high-fat diet and exercise group (HE) group of 10 rats. HE group weekly forced to swim six times, each time 1h, sports 10 weeks. After 10 weeks, serum LPL, HL, ApoC Ⅱ content, etc.; fixed time measurement of body weight per week. Experimental results showed that after 10 weeks, H group weight, LPL, ApoC Ⅱ were significantly higher than the other two groups ($p < 0.05$), HL levels were significantly lower ($p < 0.05$). Conclusion The experimental data can be considered exercise can reduce weight, and by elevated serum LPL, ApoC Ⅱ levels, lower HL concentration to regulate lipid metabolism disorders.

Introduction

In recent years, the increasing incidence of hyperlipidemia high, the most common complication of atherosclerosis, has become a major threat to the health of the elderly [1-2]. At present generation and that the high-fat, high fever, diet and exercise to reduce hyperlipidemia about [3-4]. Suitable aerobic exercise can reduce cholesterol, improve lipid metabolism problems. By studying rats swimming exercise on fat metabolism regulation fat diet, mainly rats by measuring the serum LPL, HL, ApoCⅡ to discuss the content of lipid metabolism in motion the mechanism of mediation for the prevention or amelioration of hyperlipidemia offer Theoretical basis.

Materials and methods

Animals and grouping. 30 SD rats, an average of 6 to 8 weeks old, weighing 200~240g, provided by the hospital laboratory animals. The rats were randomly divided into normal diet control group (group C), high-fat diet group (H group), high fat diet and exercise group (HE group), 10 rats in each group. All rats were temperature (20±3℃), natural lighting are allotted to cages, HE group were forced to swim movement, six times a week, every 1h, movement 10 weeks. Time weighed weekly body weight of rats.

Experimental drawn. All rats were fasted for sampling the night before 10:00, 8:00 the next morning sampling, sampling exercise group rats within 24h after exercise. Weigh weight after row 30g / l of sodium pentobarbital anesthetized by intraperitoneal injection (20mg/kg), the abdominal aorta measurement of blood serum LPL, HL, ApoCⅡ content.

Data Processing. The obtained experimental data using SPSS 15.0 software for statistical analysis ANOVA, two sets of variables were compared using the t test. P <statistically significant difference at 0.05.

Data

Experimental rats before and after the change in body weight. By the following table data showed that the rats before the experiment no significant difference in body weight. Group H after 5 weeks significantly increased body weight than the control group (p <.0.05), HE H group and body weight decreased significantly (p <.0.05) compared. H group after 10 weeks compared to group C weight increased significantly (p <.0.05), and HE C group no significant changes in body weight, compared with H group compared to body weight decreased significantly (p <.0.05), swimming can be described suppress weight gain in rats.

Table 1. Experimental rats before and after the change in body weight

Packet	Before the experiment body weight /g	5 weeks later body weight /g	after 10 weeks Body weight /g
C	218.12±16.59	332.68±15.49*（p=0.026）	423.61±14.73*
H	221.36±13.22	413.26±18.77	519.33±13.83
HE	216.87±18.24	338.94±16.23*（p=0.031）	434.12±11.69**

Note: * Compare p<0.05, ** and high-fat diet group compared with the control group, p<0.05

10 weeks the serum LPL, HL, ApoCⅡ change. The following table can be observed through 10 weeks after H HL serum levels were significantly higher compared to group C (p<0.05), HE group was significantly lower compared with the H group (p<0.05); 10 weeks after the Group H LPL, ApoCⅡ compared to the other two groups was significantly lower (p<0.05), while the HE group compared with the control group had no significant change, indicating that exercise can make the serum LPL, ApoCⅡ significantly higher, HL decreased, so as to achieve price lipid metabolism the goal of.

Table 2. LPL serum in each group after 10 weeks, HL, ApoCⅡ change

Packet	LPL	HL	ApoC Ⅱ
C	1.58±0.07	1.25±0.04	1.30±0.07
H	0.62±0.06*	1.59±0.08*	0.71±0.05*
HE	1.18±0.04*	1.36±0.05	1.13±0.06*

Note: * Compared with normal control group, p <0.05, * compared with the high-fat diet group, p <0.05

Discussion

LPL by parenchyma cell synthesis and secretion. The expression of LPL has tissue specificity, in the cardiac muscle, skeletal muscle, high expression of adipose tissue and also seen in macrophages、kidney、breastand part of the brain tissue. LPL is in embryo and newborn lier expression, no expression in the adult liver.

Perreault L et al. Studies have shown that a resistance movement after male skeletal muscle and adipose tissue of LPL activity increased, but not increase LPL activity in women. Michael H et al. Research, however, think that a movement does not affect the activity of LPL. They will be 24

healthy male immediately into three, the first group is not movement of the control group, the night before the second group of 100 min after fasting, make its lack of energy, the night before the third group of 100 min after drinking the same movement carbohydrates, make its energy back to normal state. Results three groups of plasma LPL activity, HDL,LDL and medium density lipoprotein concentrations had no significant difference.

As early as 1995, Seip RL and others are studied for 5-13 days of the exercise on skeletal muscle and fat cells LPL expression, found the movement to promote the expression of skeletal muscle LPL (mRNA increased by 117%, protein 53% increase) and activity increased (35%), LPL of adipose tissue. Now believe that long-term exercise can increase the skeletal muscle, myocardial, LPL expression and activity in the plasma and adrenal reduce adipose LPL expression and activity of the organization. 10 weeks swimming training increase the activity of diabetic rats plasma LPL (diabetic rats plasma LPL activity significantly reduced), thereby reducing the plasma insulin and blood sugar level, improve lipid metabolism. In addition, the muscle fiber type also influence the activity of LPL. Slowly shrink red muscle LPL activity, ability to absorb TG strongest； And fast shrinkage of white muscle LPL activity, lowest intake TG ability is the worst. Weber JM found that 4 days swimming movement. Later, in the red muscle of the fish LPL activity increased significantly.

Multiple studies have confirmed that high sugar, high fat diet can increase LPL expression and activity of adipose tissue and skeletal muscle. Yamazaki T et al The study found that ddY (after eating high TG mice model) in mice fed a high-fat diet, heparin after plasma LPL activity does not increase, while the control group of mice after heparin plasma LPL activity increased 4.8 times, this is ddY high TG after mice fed a high-fat diet and obesity. Liu Y, et al. Found that high-fat diet increased miniature pig plasma LPL activity and reduced the renal expression of LPL and activity. If give a high-fat diet of miniature pig complement Ibrolipim activator (LPL),increased renal LPL expression and activity, reduce weight, blood glucose, blood insulin and TG levels, and inhibiting TG and cholesterol accumulation in the kidney, play the role of renal protection and fall hematic fat. Arterial expression of LPL is a sign of atherosclerosis. Fed saturated fat and n - 3 fatty acids increase, reduce artery respectively the expression of LPL, thereby, reduce artery of LDL deposition respectively. L1 of insulin receptor knockout mice fed 12 weeks of normal meal, saturated fat, and n - 3 fatty acids, n- 3 fatty acids significantly reduce artery LPL level, so as to realize its improve lipid metabolism, delay the progress of IR, reduce LDL deposition.

The main sources of lipids are lipids of foods, because it is insoluble in water, and thus are often broken down into triglycerides, the cholesterol, phospholipid, synthetic lipoprotein greater solubility, transport in the form of complexes in the circulation[5-6]. The test rats were given high-fat diet rich in exogenous lipids, resulting in rat cholesterol, saturated fatty acid intake increased in rats in vivo metabolism of lipid metabolism and thus give rise hyperlipidemia. It is generally believed that the energy consumption increases movement, reduce excess body fat, not only can lose weight, but also can alleviate the symptoms of hyperlipidemia, prevention of high blood lipids and can cause complications such as atherosclerosis and the like.

Through this experiment, it can be observed intake of high-fat diet can significantly increase the body weight of rats ($p<0.05$), described not only excessive intake of lipids can cause elevated blood lipids, excess lipids stored in the body, there may be induced obesity[7-8]. Additionally, this article by serum LPL rats in each group after the experiment, HL, analysis ApoCⅡ content changes that exercise on reducing blood lipids have a positive effect. LPL also known as lipoprotein lipase, is a synthesized by the liver can promote the exogenous and endogenous lipid metabolism enzymes, ApoCⅡ as an apolipoprotein molecule, is indispensable LPL play a catalytic cofactor ApoCⅡ

content increased LPL can promote the decomposition of the lipids. The experiment was observed after 10 weeks of training hyperlipidemia serum LPL, ApoCⅡ content was significantly higher ($p<0.05$), an appropriate description of aerobic exercise can be to regulate the role of lipid metabolism by increasing enzyme activity in vivo; big fat exercise group HL rat plasma was significantly reduced ($p<0.05$), described exercise can make plasma HL activity increased, to achieve the purpose of improving lipid metabolism disorders [9-10]. Cause produce hyperlipidemia are many, on the one hand, too much food lipids lead to an exogenous increase in lipid intake, too much lipids stored in the body lead to hyperlipidemia and obesity ; on the other hand, the intake of high-fat diet in the same premise, exercise body weight, LPL, HL, ApoCⅡ indicators significantly better than the high-fat diet group ($p<0.05$).

In summary, not only need to pay attention to dietary intake, reasonable and appropriate physical exercise on the prevention and improvement of hyperlipidemia also have a positive effect.

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