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**Research Article**

# THE COMPARISON OF THE EFECT OF EIGHT WEEKS AEROBIC AND RESISTANCE TRAINING ON LIPID PROFILE IN PATIENTS WITH DIABETS TYPE 2

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## ABSTRACT

**Introduction:** In the recent studies, effects of the physical activity and regular exercise in preventing and postponing diabetes type 2, increase in insulin sensitivity and improvement in glucose metabolism has been observed. Purpose of this study is to survey the effects of aerobic training and resistance training on lipid profile in patients with diabetes type 2.

**Methods:** 45 patients with diabetes type 2 were selected by the targeted sampling method and divided into two aerobic training and resistance experimental groups and one control group. Experimental groups exercised for 8 week, 3 sessions per week, each session 45 to 70 minutes. In this period the control group had no regular exercise. In this study, multiple variables like TG, TC, LDL and HDL was measured before and after training course. Finally, the results were analyzed with repeated measure test in significance level of 95%.

**Results:** results of this study showed a significant improve in TG and HDL after aerobic training course and meaningful improve in HDL after resistance training course.

**Discussion:** results of this study showed that aerobic training course had more effect on improvement of lipid profile rather than resistance training course.

**Keywords:** Diabetes Type 2, Aerobic Training, Resistance Training, Lipid Profile.

## INTRODUCTION

Physical activity and exercise will decrease the risk of more chronic diseases like artery diseases, Osteoporosis, some kinds of cancers, and nerve disorders like Alzheimer. There is a strong link between diabetes and exercise. This link is generally related to diabetes type two. A few reports show the effects of exercise on diabetes type one. These reports emphasize more on the role of exercise in controlling the blood glucose of body[1]. Patients with diabetes have weak ability to control the blood glucose and insulin resistance of body a long with the high blood pressure, high lipid and finally arteriosclerosis. So, patients with diabetes type two will be subjected to cardiovascular and arteriole diseases. The most important aims of patients with diabetes are controlling the blood glucose and the lipids of body[2]. Diabetes type two will be identified relatively with insulin resistance, the increase in the production of hepatic glucose and the decrease in the amount of insulin. In diabetes type two, the problem will be found generally in particular tissues of muscles. The resistance of these tissues was great to the insulin and made hyperglycemia in the body[3]. In recent decades, the decrease in physical activities will increase the patients with diabetes type two[4]. Since obesity is the most important factor in making diabetes, physical activity and exercise are effective in preventing and treating diabetes type two[5]. We can attribute the benefits of regular physical activities to the weight loss; the weight control in a normal level; the increase in insulin resistance; the decrease in drug consuming and insulin injection; the health of cardiovascular system; the decrease in blood pressure, nerve tensions, physical fitness; and happiness[6]. If people exercise regularly along with healthy diet, they will not be stricken to diabetes. Having physical activity is very effective in preventing people from diabetes.

Exercise was one of the main factors which controlled the blood glucose in patients with diabetes type two. Studies showed that the increase in physical activity not only prevented people from diabetes, but also it was effective in treating patients with diabetes type two[5]. Since the number of people with diabetes two is increasing every day, we have to find an appropriate solution for this kind of disease. Diabetes type two will make many problems for people who are stricken to this kind of disease. These problems are high blood pressure , obesity , high lipid , Retinopathy , Nephropathy , heart failure , stroke , nerve disorders , ischemia and etc. Exercise can be an appropriate solution for people who suffer from diabetes type two because it can control obesity and the blood glucose of body; affect the insulin resistance; prevent people from heart diseases a long with the change in the life style of these patients and their appropriate diets[1,5-11]. The effects of aerobic and resistance exercises on lipid profile were surveyed separately in previous research reports. Less research is attributed to the aerobic and resistance exercises. It is necessary for us to compare these three methods in order to select the best method for decreasing the problems of diabetes and preventing people from diabetes. So, we can prevent people from wasting time and incurring a lot of expenses .Moreover, we can improve the life style of patients with diabetes type two.

## MATERIALS AND METHODS

Researchers conducted some pre-tests and post-tests on men who were stricken to diabetes type two. The age of these patients was between 45 to 65 years old. These examinees did not have any cardiovascular diseases, regular physical activities and symptoms of diabetes like wound in their legs. In addition, these patients did not use insulin. 45 patients with diabetes type two which were volunteered for this research were selected with the targeted sampling method. When these examinees completed the forms of testimonials, researchers cupped from them to measure their cholesterol total (TC), triglyceride (TG), HDL-Cholesterol and LDL-Cholesterol. Then these examinees were divided randomly into two experimental aerobic and resistance training groups and one control group. Each group was included 15 examinees. Aerobic training group did some activities like walking, running, and jogging for eight weeks (three sessions per week, each session 20 to 45 minutes with the intensity of 60 to 85 percent potential heartbeat. Resistance training group did body building for eight weeks (three sessions per week, 8 to 24 frequencies with the intensity of 60 to 85 percent of one maximum frequency). Each exercise session was included three steps. The first step was warming up. People should stretch the muscles of their low parts of their bodies and also increase their heartbeat slowly with walking and stretching their muscles. The second step was the main exercise. The third step was cooling down. At the end, people should cool down for ten minutes to decrease their heartbeat[12,13] and restore to their previous state. Control group was included 15 persons who were suffered from diabetes type two. These people did not participate in any regular and particular physical activities. Also they followed their daily activities. After these three groups exercised for eight weeks, researchers took a test from them to survey the effects of aerobic training group, resistance training group and control group on factors like LDL, HDL, TG and TC. These patients did not eat anything for 8 to 12 hours. Researchers cupped 5 ml blood from these patients. Lipid profile which was included triglyceride, cholesterol total, HDL-cholesterol and LDL-cholesterol was measured with the classic Alfa system, photometric- enzymatic test and the testing company of Iran. Researchers analyzed the variance of each group with repeated measurements to survey the changes in above variables in each group. They also analyzed the data with SPSS software of version 20. The meaningful level of this software was less than 0.05.

## RESULTS

Researchers studied on 45 patients with diabetes type two (15 persons in each group). Physical and physiological characteristics of these groups were shown in table one. The changes in above variables were surveyed in each group and also shown in table two.

**Table 1: Physical and Physiological Features of Examinees**

| Sig. | F | control | Resistance training | Aerobic training | variables |
|---|---|---|---|---|---|
| 0.349 | 129 | 53.49 ± 7.07 | 20.79 ± 6.27 | 34.49±6.49 | Age (year) |
| 0.463 | 1.082 | 25.125±5.81 | 12.174± 4.51 | 97.171±6.91 | Length (cm) |
| 0.990 | 0.039 | 60.85 ± 7.06 | 72.85 ± 7.89 | 50.85 ± 7.78 | Weight (kg) |
| 0.479 | 0.838 | 71.28 ± 5.16 | 49.30 ± 3.92 | 68.29 ± 3.39 | The maximum consumed oxygen |

**Table 2: The results of research**

| Sig. | F | Control | | Resistance training | | Aerobic training | | Group variables |
|---|---|---|---|---|---|---|---|---|
| | | Post-test | Pre-test | Post-test | Pre-test | Post-test | Pre-test | |
| 0.69 | 0.49 | 47.155±28.48 | 20.153±60.44 | 83.138±72.23 | 80.142±56.41 | 87.125±61.41 | 60.139 ±31.51 | TG |
| 0.04 | 2.89 | 63.301±13.30 | 73.276±40.33 | 17.240±51.29 | 57.268 ±61.23 | 83.250±22.37 | 57.275±23.28 | TC |
| 0.04 | 2.90 | 26.33±5.78 | 73.38±7.26 | 60.42±7.07 | 67.38±5.99 | 27.46± 9.32 | 20.39±10.9 | HDL |
| 0.93 | 0.15 | 93.124± 19.22 | 20.125±49.27 | 93.117±99.16 | 20.123±44.24 | 33.118± 86.23 | 67.128±69.27 | LDL |

## DISCUSSION

In the present research, the amount of HDL was increased in patients with diabetes type two with aerobic and resistance exercises. The amount of LDL and triglyceride were not changed significantly in these patients with aerobic and resistance exercises. With regard to the mentioned data in table 2, aerobic exercise was the only exercise which decreased the amount of cholesterol total. Our findings were similar to the findings of Marwick[14], Balducci[15] , Dunstan and their co-workers[16]. Our findings showed that one training course will increase the amount of HDL and decrease the amount of cholesterol total in patients with diabetes type two. Gordon and his co-workers surveyed the effects of exercise on lipid profile, markers of oxidative stress and antioxidants in patients with diabetes type two and confirmed the effects of Hatha yoga exercise on blood glucose, lipid, markers of oxidative stress and antioxidants in patients who suffered from diabetes type two. Gordon and his co-workers stated that Hatha yoga and aerobic exercises were effective in treating, preventing and protecting patients with diabetes type two with the decrease in oxidative stress and improvement in antioxidants[17]. Rahimi and his co-workers studied the effects of eight weeks water exercises on lipid profile of patients with diabetes type two.

They worked on 30 men who were 50 to 60 years old. this research showed significant differences between the average of VLDL, LDL ,HDL, TG, TC in experimental and control groups. The recent research showed that water exercises would improve lipid profile in patients with diabetes type two[18]. On the other hand, the results of this research were different from the results of Gordon and Misra about the changes in the amount of LDL and cholesterol total in patients with diabetes type two[17,19]. Mr. Honkola and Mr. Yang showed that their exercises would reduce the amount of triglyceride and LDL in patients with diabetes type two. In recent research, these changes were not significant. So, the results of the present research were not similar to the results of mentioned research about the changes in the amount of LDL and triglyceride[20,21]. We can attribute the difference between the results of mentioned research and recent research to the intensity and the duration of exercise and also the age and the sex of research samples. Since the recent research showed no changes in the HDL of patients with diabetes type two, the results of present research were different from the results of Mr. Sigal[22] and Castaneda[23] research. Obesity is very common in patients with diabetes type two along with lipid disorders. The increase in the amount of LDL and the decrease in the amount of HDL will increase cardiovascular diseases in patients with diabetes type two[24]. One of the most prevalent forms of dyslipidemia in people with diabetes type two was the increase in triglyceride and the decrease in HDL[25]. Most studies showed that the increase in triglyceride, LDL , TC and the decrease in HDL were considered the most important dangerous factors in cardiovascular patients[26]. Researchers showed that the approximate decrease of five percent was very important in the amount of LDL. For example, researchers showed that one percent decrease in the amount of LDL would decrease the risk of cardiovascular diseases 1.7 percent. Moreover, one percent increase in the amount of HDL in patients with diabetes type two would decrease the risk of cardiovascular diseases three percent[27,28]. LDL has an undesirable effect on the artery wall and will accelerate Atherosclerosis. In this research, exercise was not the only thing that decreased the amount of LDL in patients with diabetes type two. We can reduce the amount of LDL in patients with diabetes type two with regular exercises and prevent them from heart diseases. Although exercise and physical activity do not reduce the ratio of triglyceride to LDL a lot, they have useful effects on the particles of LDL[29]. HDL has anti-atherogenic properties. The recent research showed that the amount of HDL will be increased in patients with diabetes type two. So, the increase in HDL will change RCT. RCT is a complicated mechanism which involves a lot of reciprocal reactions. Maybe, high HDL is one small part of mechanisms which reduces the risk of CHD in patients with diabetes type two. In addition, another sensitive role of HDL will be done on CHD with the LDL oxidation. HDL will facilitate the decomposition of lipid sediments in patients with diabetes type two [30]. In fact, HDL can remove cholesterol from tissues or convey very light lipoproteins to the liver [31]. HDL has an important role in the cholesterol transport pathway. The increase in HDL is related to the intensity and the amount of practice [30]. Moreover, the increase in plasma HDL is related to the weight loss and the decrease in plasma triglyceride based on some reports. These changes will improve the sensitivity in insulin[28,32]. One of the probable reasons which increased the amount of HDL was related to [30,33] the high activity of Lipoprotein lipase enzyme due to physical activity [32]. LPL enzyme is effective in the conversion of VLDL to HDL. The level of HDL-C will be increased with the increase in the activity of LPL enzyme. On the other hand, LCAT will convert cholesterol to the particles of HDL besides LDL. The increase in LPL enzyme may have an important role in increasing the amount of HDL[34] resulting from practice. LCAT was increased a lot in some exercise practices[34,35]. It seems that exercise will also increase the amount of Lipolyze and decrease the amount of fatty acids in the muscles[36,37]. The increase in the activity of LPL enzyme will accelerate the decomposition of glycerol in VLDL and remove lipoprotein particles from them. So, LPL enzyme will make free cholesterol and phospholipid in VLDL and also convert them to HDL and increase the amount of HDL[37]. Another reason of increasing in the amount of HDL is referred to the increase in HDL production with liver due to the changes in the activity of LPL enzyme and the decrease in hepatic lipase due to the physical activities[37]. Probably, some mechanisms like the decrease in the sensitivity of insulin which make some changes in the level of lipids and lipoproteins can be effective in increasing the level of HDL[38]. In this research, we found out that exercise had no significant effects on the level of LDL and TC. The size of LDL particles will probably be changed in response to the exercise. If we spend a lot of energy in one practice session, the density of plasma cholesterol will be decreased. So, such a practice can increase the density of HDL. The opposed changes between the increase in the HDL and the decrease in the triglyceride and VLDL are due to the increase in the activity of LPL enzyme. LPL enzyme will

decompose the tri-acil-glicerol in the VLDL and decrease the amount of lipoproteins. Free cholesterols and surplus phospholipids will be converted into HDL. The particles of HDL will be consumed due to exercise. Exercise will activate LCAT[39]. Since aerobic exercise will decrease the weight of people, it is probable that the amount of cholesterol is decreased in patients with diabetes type two with aerobic exercise in this research. The recent research emphasized on the effects of resistance exercise a long with the aerobic exercise. The main benefits of resistance exercise were as follows:

1) It can increase the amount of HDL
2) It can improve the efficiency of heart
3) It can decrease the blood pressure
4) It can increase the sensitivity in insulin and control the blood glucose of body
5) It can improve the strength of muscles[40]

Researchers acknowledged the useful and unavoidable effects of exercise on patients with diabetes type two based on the recent research. Aerobic and resistance exercises play positive roles in decreasing glycemic indexes and preventing people from the risk of cardiovascular diseases. In recent research, the amount of HDL was increased in these patients with aerobic and resistance exercises. Also aerobic exercise decreased the amount of cholesterol total lonely. Both aerobic and resistance exercises play very important roles in preventing and controlling insulin resistance in patients with diabetes type two. These two exercises should be done regularly and steadily to be effective in patients with diabetes type two.

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