

## The Effect of Aerobic Training on Visfatin, Total Cholesterol and High Density Lipoprotein of Middle Age Females

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### Abstract

**Aim:** aim of present study was to review the effect of eight weeks aerobic training on visfatin total cholesterol and high density lipoprotein of middle age females. **Materials and methods:** For these purpose 30 females (mean age 48/73±9/44 y, height 156/03±5/6 cm and weight 68/37±10/57 kg) who attend in odd day's morning sport class of hejab gymnasium of shiraz city after fill health and informed consent questioners randomly selected as statistical sample. At first after measure the height and weight, subjects base on their body mass index, divided in two equal groups. Aerobic trainings were included eight weeks aerobic training with intensity of 55-65 percent of maximum heart rate and three sessions per week. Fasting blood samples were taken 24 hours before start training period and after finishing last training session. For statistical analysis of findings used dependent and independent t test ( $\alpha \leq 0/05$ ). **Results:** results showed that eight weeks aerobic training has no significant effect on increase in visfatin ( $p=0/08$ ), reduction in total cholesterol ( $p=0/38$ ) and increase

in high density lipoprotein ( $p=0/38$ ). **Conclusion:** base on results of present study eight weeks aerobic training has no significant effect on increase in visfatin, reduction in total cholesterol ( $p=0/38$ ) and increase in high density lipoprotein reduction in total cholesterol and increase in high density lipoprotein. So it suggests to middle age and untrained people for control the effective factors on obesity use high duration aerobic exercises.

**Key words:** aerobic training, visfatin, total cholesterol, high density lipoprotein

### Introduction

Today obesity is one of important factors of mortality and chronic and fatal diseases. Obesity is defined as excessive accumulation of fat in the body. Fat tissue in addition to the storage and release of triglycerides can secrets many proteins which these proteins have role in cholesterol metabolism, immune system actions, regulation of energy cost, insulin action and nutrition (Dominik., 2006). Also fat tissue in addition to storage of fat has important role in homeostasis of whole body as an active tissue by secretion of various hormones that called Adipocytokin. Adipokines have role in the physiological and pathophysiological

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routes by several mechanisms and in practice they could have protective or predisposing role in getting people to chronic diseases (Kowalska., 2007 & Mastorakos., 2007). Visfatin is one of the Adipokines that mostly secreted by visceral fat tissue and its gene expression and plasmatic levels reduces in obese humans. Metabolic effects of visfatin occur primarily by binding and activating the insulin receptor (Bermejo., 2006, Berndt., 2005 & Claudio., 2006). Studies represent that increase in visfatin induces increase in insulin sensitivity and correspondingly reducing insulin resistance. Results of past studies have shown that plasmatic concentrations of visfatin reduced in human who have abdominal obesity or diabetic people. In the other hand it has been reported that glucose concentration affects serum concentration of visfatin and this impressibility changes by some medications (Moschen., 2007). Indeed serum levels of visfation have reverse relationship with body fat percentage. There are many factors affecting reduction of body fat percentage and cardiovascular risk factors that these factors include the nutrition, environment, socio-economic status and exercise. Beneficial effects of exercise in preventing and reducing cardio-vascular diseases has shown in various researches, but its mechanisms are not well understood. When fat tissue accumulates around body is susceptible to many diseases. Epidemiological data show that the prevalence of obesity significantly increased over the past 20 years. Studies have shown that low density lipoprotein (LDL), very low density lipoprotein (VLDL) and total cholesterol increase in obese subjects also high density lipoprotein (HDL) reduces. Regards to the role of inflammation in the pathogenesis of cardio-vascular disease, reduction of inflammatory markers through exercise maybe one of mechanisms of reduction in cardio-vascular disease. In the area of exercise science pparticularly in exercise

physiology and sports medicine researches has been done (Nikkilä ., 1980, Ring-Dimitriou et al., 2007 & Vuorimaa et al., 2005). Although the effect of exercise on these parameters studied in the various populations in the past decade, the results of these studies based on their type and nature are along with inconsistencies in change of visfatin concentration in response to exercise. Thus, with respect to the noticed matters above in connection with the exercise necessary to improve the complications of inactivity and its induced obesity and also improve in blood and tissue factors that influence obesity and insulin resistance, present study seeks to answer this question that do aerobic training has a significant effect on visfatin, total cholesterol and high density lipoprotein?

## **Methods**

### **Subjects**

Present study in a quasi-experimental study. Statistical population of present study included 90 women over 35 years who attend in odd day's morning sport class of hejab gymnasium of shiraz city. 30 women who had no history of special diseases such as diabetes, blood pressure, cardio-vascular and respiratory disease after fill health and informed consent questioners randomly selected as statistical sample. Demographic characteristics of the subjects are presented in Table 1.

### **Training protocols**

First, for homogeneity of the experimental and control groups, out of 30 volunteers measured parameters such as height, weight and body mass index. Then regards to the significant positive correlation between body mass index with concentration of visfatin, total cholesterol and high density lipoprotein, subjects were divided into two groups based on body mass index. The health, general information and informed consent questionnaires were completed by all subjects. Fasting blood samples collected

in lab 24 hours before start of training. Training protocol consisted eight weeks aerobic training and three sessions per week. Training program consisted 30 min warm up, include walk around the gym, stretching and kinetic movements and eight minutes running with intensity of 55-65 percent of maximum heart rate in first session that per two sessions one minute was added to running time. After eight weeks running time was 20 min and final 10 minutes was for cooling. At the end of each training session 10 minutes of cool-down include stretching and walking was done. 24 hours after the last training session, all subjects of experimental and control groups according to pretest were present in the laboratory and seven ml of blood was taken from them again. Also for control the short- term effects of diet on mentioned indicators, subjects were asked to have same diet for 24 hours before the pre-test and post-test. To determine the intensity of exercise (55- 65 percent of maximum heart rate) maximum heart rate formula was used.

Exercise Heart Rate= 55- 65 % (220-Age)

### Blood sampling

All subjects in the study period were not taking any medication. Blood samples were collected to determine the rest concentration of visfatin, total cholesterol and high density lipoprotein in pre- test (before start training program) and post-test (after the training program). Blood sampling at 8-9 AM was done by trained technicians and subjects were fast. 7 ml venous blood was taken from anterior vein

of the left elbow of subjects. For measure visfatin used ELISA kit of ALPCO Diagnostics, Salem, NH also cholesterol and high-density lipoprotein were measured using diagnostic kit of cholesterol and high-density lipoprotein by photometric method.

### Statistical analysis

Due to the random distribution of subjects in the experimental and control groups and confidence of normality of data by (kolmogorov- smirnov test) for compare the visfatin, cholesterol and high-density lipoprotein between experimental and control groups and also within these groups used independent and dependent t test respectively. All information is reported based on the mean and standard deviation. The level of significance was considered  $\alpha \leq 0/05$  for all stages of calculation.

### Findings

Concentrations of Visfatin, cholesterol and high-density lipoprotein in both groups are shown in Table 2. Independent t-test results showed that there is no significant difference in visfatin ( $p=0/11$ ), cholesterol ( $p=0/78$ ) and high density lipoprotein ( $p=0/20$ ) changes following eight weeks aerobic exercise training in experimental and control groups. also dependent t-test results showed that eight weeks aerobic exercise training has no significant effect on increase visfatin ( $p=0/08$ ), cholesterol ( $p=0/38$ ) and high density lipoprotein ( $p=0/38$ ) (table 3).

Table 1. demographic characteristics of subjects (M  $\pm$ SD)

Subjects Variable	Experimental (N= 15)	Control (N= 15)
Age (year)	44.46 $\pm$ 2.29	53 $\pm$ 2.1
Height (cm)	157.40 $\pm$ 1.64	154.66 $\pm$ 1.16
Weight (kg)	66.50 $\pm$ 3.29	70.24 $\pm$ 2.02
Body Mass Index (kg/m <sup>2</sup> )	27.01 $\pm$ 1.49	29.33 $\pm$ 0.69

Table 2. statistical analysis of visfatin, cholesterol and high density lipoprotein in experimental and control groups

variable	time of test	experimental group	control group
Visfatin (Ng/ml)	Pre Test	6.637 ± 1.83	8.17 ± 1.72
	Post Test	7.29 ± 0.77	8.06 ± 1.88
Cholesterol (mg/dL)	Pre Test	232.13 ± 44.62	206 ± 35.19
	Post Test	222.73 ± 34.79	199.66 ± 36.38
High Density Lipoprotein (mg/dL)	Pre Test	56.73 ± 14.66	59.06 ± 11.2
	Post Test	58.8 ± 12.62	57.6 ± 12.21

Table 3. results of independent and dependent t tests for compare the visfatin, cholesterol and high density lipoprotein in research groups

P	df	Independen t t test	Group	dependent t test	df	p	Variable
0.11	28	1.62	Experimental	-1.87	14	0.08	Visfatin
			Control	0.26	14	0.79	
0.78	28	-0.28	experimental	0.89	14	0.38	Total
			control	2.39*	14	0.03	cholesterol
0.20	28	1.29	experimental	-.089	14	0.38	High
			control	1.51	14	0.15	density lipoprotein

p ≤ 0/05\*

## Discussion

Results of present study showed that two months aerobic training has no significant effect on increase of visfatin. About the effect of exercise on visfatin can point to Frydeland-larsen study (2006). The result of Frydeland-larsen study is contradicted with present study. These researchers showed that exercise induces increase in expression of visfatin mRNA in subcutaneous fat tissue of healthy males (Frydeland-Larson., 2006). Perhaps one of the reasons of inconsistent results in Frydeland-larsen et al study with present study maybe due to different types of subjects. Because in Frydeland-larsen et al study used young male subjects. These subjects because of their youth were able to perform higher intensity exercise than present study subjects. Indeed Visfatin has diabetogenic and immunomodulator effects that has role on physiology of insulin resistance in obese and type 2

diabetic humans and Changes in fetal development (Dahi., 2007 & Song., 2008). It appears that visfatin is involved in biosynthesis of mono-and di- nucleotide, but its role as Adipokine is insulin-like effect that Induces glucose uptake by muscle and fat cells and reduction in release of glucose from liver with a different mechanism from insulin and by binding to insulin receptors in different position from insulin position (Fernandez., 2007). Visfatin activates the insulin receptor and makes a major insulin-like effect in vitro and in vivo (Karalisch., 2005). Hence, given that physical activity has an insulin-like effect, In fact, exercise can increase translocase of glucose transporters (GLUTS) to the cell surface, Visfatin also has the same effect with this mechanism; more likely exercise should lead to increase in visfatin concentration. However, long duration exercises can induce increase in visfatin concentration

by reduce body weight and body fat percentage (Trayhurn & Wood., 2004). Results of Dominik (2006) study are consistent with results of present study. These researchers showed that exercise has no significant effect on visfatin of type 1 diabetic patients (Dominik., 2006). The reason of same results can be due to equal intensity prescribed for those patients and subjects of present study.

Results of present study showed that two months aerobic training has no significant effect on reduction of total cholesterol. Findings of some researchers (for example Kraus et al 2002 and Altena et al 2006) are inconsistency with present study (Kraus et al., 2002 & Altena et al., 2006). Low-density lipoprotein is the main carrier of cholesterol in plasma. Cholesterol by full endocytosis of low-density lipoprotein delivered the cells. This kind of endocytosis is most abundant than endocytosis of other lipoproteins. Low-density lipoproteins normally carry 60 to 80 percent of plasmatic cholesterol and have a high tendency to stick to the walls of the arteries (Vuorimaa et al., 2005). Cholesterol sediment in the artery wall caused the growth of smooth muscle cells of the artery wall under sediment location and absorption of fibroblasts (they accelerate the blood clots in the that region) and If this action operated in coronary vessels supplier blood to heart tissue, it may prevents adequate oxygen reaching the heart tissue, which may lead to myocardial infarction or necrosis in the region of the heart (Song., 2008). Short-term response of plasma cholesterol to exercise seems to be different between males and females. High-density lipoprotein cholesterol in men typically increases, while the total cholesterol reduces in women. 1200 to 2200 kcal of energy expenditure per week creates favorable changes in high-density lipoprotein cholesterol (Vasankari et al., 1998). High-density lipoprotein cholesterol increases when intensity resistance training is moderate and number

of repetitions is high, in compared with the high intensity and low repetition. Plasmatic concentration of fat in people who train aerobic exercises is low so that they are less exposed to the risk of atherosclerosis than other. In sum, they have healthy lipid profile (Vasankari et al., 1998).

Results of present study showed that high density lipoprotein had no significant change after two months aerobic training. Vasankari et al (1998) in review the effects of 10 months aerobic exercise training program on the oxidation of low-density lipoprotein cholesterol and other risk factors of blood fats (Vasankari et al., 1998). Results of some researches such as Kraus et al (2002) in review the effect of intensity and duration of training on plasmatic lipoprotein (Kraus et al., 2002), Varma (2007) in review the effect of acute Long-duration exercise on oxidation of low-density lipoprotein of healthy men (Varma., 2007) and Altena et al (2006) in review the changes of low-density lipoprotein, high density lipoprotein and other related risk factors after four weeks of exercise with intensity of 70 % maximum heart rate (Altena et al., 2006) are in contrast with results of present study. The difference in results of studies could be due to different factors such as exercise intensity, exercise duration, gender and total calories consumed per session exercise or total training period. One reason for the conflicting results of the present study with study of Kraus et al could be due to training duration so that in present study training duration was two months but in study of Kraus et al training duration was eight months, Thus likely higher exercise duration is more likely to increase the high density lipoprotein.

### **Conclusion**

Given that the major contribution to the treatment and control of diseases is upon to people of society and many factors such as proper exercise can affect diseases, learn how to correctly perform the exercise

is a necessity. But value of an education is depends on its influence and change or creation of health behavior; and changing behavior is not a goal that is easily attainable. Recently, aerobic exercise and resistance training have been considered as effective and safe therapeutic tool in the treatment of many diseases. According to the reports, these experimental interventions are effective like drugs and dietary supplements in daily energy consumption, increased insulin sensitivity, self-sufficiency and quality of life (Trayhurn & Wood., 2004). Also exercises have potential to increase muscle strength, fat free mass, bone mineral density, and reduce joint symptoms that can have relatively rapid improvement in functional status. The person will get the reward for his/her effort and his confidence increased. Because usually in per training session several exercises can be done, some consider it more varied and less boring. Base on results of present study eight weeks aerobic training with intensity of 55- 65 percentage of maximum heart rate has no significant effect on increase of visfatin, reduction of cholesterol and increase of high density lipoprotein. So it is recommended for non-athletes and middle-aged people that use aerobic exercise with higher duration for control factors affecting cardiovascular health.

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