

ORIGINAL ARTICLE

Response of Leptin and C-reactive Protein Serum Levels to 12 Weeks Moderate Intensity Aerobic Exercise in Obese Men

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KEYWORDS

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ABSTRACT: The aim of this study was to investigate the effect of 12 weeks moderate intensity aerobic exercise on leptin and C-reactive protein serum levels in obese men. The study was conducted in Urmia- Iran in 2015. Twenty-four obese men with an aged range 40-50 yrs. were enrolled into the study. Subjects were randomized to one of 2 groups exercise (n=12) and control groups (n=12). The exercise group performed aerobic exercise training up to 50-70 % heart rate reserve, three times a week for 12 weeks. Leptin and CRP serum level was measured by ELISA method before and after the 12 weeks. After 12 weeks exercise training, leptin and CRP serum level in the exercise group compared to the control group, were decreased significantly ($P<0.05$). To sum up, 12 weeks moderate intensity aerobic exercise in the reduction of CRP and leptin concentration had a prominent role that might be effective in reducing weight and improving cardiovascular risk factors.

INTRODUCTION

Incidence of cardiovascular disease, stroke and even cancer can be due to decreased mobility or life style. Cardiovascular disease such as atherosclerosis caused by deposited fat in blood vessels including cholesterol and other types of plasma fat. The risk of atherosclerosis enhances, when there is high sediment of fat in blood vessels that

has a straight relationship with exercising, diet, age, gender, and race [1].

The mentioned problems do not have a complete impact on causing cardiovascular diseases [2]. So, researchers consider to other possible patterns in order to avoid cardiovascular diseases and obesity, some of which are leptin, C-Reaction Protein

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(CRP) and interleukin-1 (IL-1) [3, 4]. CRP is a part of plasma made in liver and its enhance is a symptom of different tissue harm and infectious disease [5].

High levels of CRP are closely dependent to obesity. There is a high positive relationship between CRP and indexes of tissue measurement including waistline, the Waistline Hipline Ratio (WHR) and body index measurement [6].

Furthermore, higher levels of leptin in obese subjects compared with lean subjects can be another effective hormone in cardiovascular disease and obesity. This peptide, secreted from white fat, plays a key role in controlling central metabolism and body weight. Cardiac-vascular diseases and obesity issues due to the leptin's role in regulating secretion, synthesis and cytokines like TNF-alpha, intelukin-6 and CRP can be justified by high leptin levels in the thin subjects compared to obese. Explain the inflammatory conditions associated with obesity and cardiovascular disease [7].

Physical activity significantly decreases the cardiovascular risk factors, such as in obese individuals, cardiovascular and diabetic patients [8]. Having a long term aerobic exercise program for diabetic patients led to a significant decrease in leptin serum, and improve insulin production [9]. Aerobic exercise led to decrease CRP serum levels of elderly men at 12 weeks [9, 10]. Nevertheless in breast cancer people does not have significant increase the leptin and plasma adiponectin levels after 16 week endurance exercise [11]. The conducted researches are not enough about the effects of physical exercise on CRP level and leptin serum.

Therefore, we should consider importance of CRP and leptin on the arteriosclerosis and obesity diseases. The aim of this study was to investigate effect of 12 weeks moderate intensity aerobic exercise on leptin and C-reactive protein serum levels in obese men.

MATERIALS AND METHODS

Twenty-four obese men participated voluntarily in the study with an age range of 45-50 years, weight 90.6 ± 10 and body mass index (BMI > 25).

The study was conducted in Urmia- Iran in 2015. According to the Ethics Committee declaration of Urmia University, after obtaining written informed consent from all subjects, we assessed dietary intake, anthropometric parameters, blood pressure and physical activity. We collected information on other variables such as age, smoking status, medical history and use drug using population responses to the questionnaire before the test. They were randomly categorized in two groups (exercise (n=12) and control (n=12)).

The subjects performed the aerobic exercise moderate intensity (running on the treadmill) up to 50-70% heart rate reserve every week three sessions 45 min for 12 weeks. Blood samples were taken from experimental and control groups before and after the implementation of exercise program. ELISA method was used for evaluating the levels of serum leptin and C-reactive protein levels by IBL kits according to the manufacturer's instructions.

The data of the research were analyzed through independent *t*-test and Paired *t*-test ($P < 0.05$).

RESULTS

Before the onset of the exercise, there were no significant differences between groups in age, anthropometric indexes, levels of CRP and leptin ($P > 0.05$). Nevertheless serum leptin concentration showed significant decrease in exercise group compared to the base condition after 12 weeks moderate intensity aerobic exercise ($P < 0.038$). In the exercise group, CRP levels was significantly decrease compared to the base state after 12 weeks ($P < 0.05$).

Leptin and CRP levels significantly decreased after 12 weeks in exercise group compared to the control group ($P < 0.05$). In addition, statistical

analysis of indicated a significant decrease in body weight and body mass index (BMI) in exercise group compared to the base condition after 12

weeks moderate intensity aerobic exercise ($P < 0.05$).

Table 1. Mean \pm standard deviation of Pre-and post-test physical, physiological and biochemical variables and t test in the two groups

Group	Index	Endurance		Control		P
		Post test	Pre test	Post test	Pre test	
	Age (yr)	-	47.2 \pm 3.85	-	46.93 \pm 4.64	-
	Weight (kg)	74.18 \pm 4.08	79.11 \pm 5.23	78.31 \pm 4.18	77.01 \pm 1.23	0.05*
	Body mass index (kg/m ²)	27.88 \pm 1.04	31.02 \pm 3.21	31.01 \pm 1.13	30.44 \pm 0.97	0.05*
	Vo ₂ max (ml/kg/min)	29.19 \pm 2.44	23.77 \pm 2.56	23.98 \pm 2.16	24.16 \pm 1.88	0.05*
	Leptin (ng/dl)	8.13 \pm 0.52	13.97 \pm 1.01	13.55 \pm 0.75	13.97 \pm 0.38	0.038*
	C- Reaction protein(mg/ml)	0.65 \pm 0.22	1.32 \pm 0.17	1.58 \pm 0.61	1.71 \pm 0.45	0.05*

DISCUSSION

In the present study, statistically significant difference was observed in the body mass index and body weight of exercise group subjects. This finding was consistent with some other studies [12, 13]. Body weight and body mass index during the interval exercise were reduced [13]. In this study, it appears that one of the main reasons for the decrease in body weight and body fat was endurance exercise.

In this study, CRP level significantly changed after 12 weeks of moderate intensity aerobic exercise. This finding was supported where CRP level body mass index (BMI) and body weight had been reduced by the exercise training for 12 weeks 3 times in the week [14].

The results of this study showed that 12 weeks endurance training causes significant decrease in leptin serum of exercise group. The finding of present study was consistent with other findings as a decrease in leptin levels [10, 15]. And contradictorily to some others that had emphasized no change in leptin levels [16]. Regular exercise and leptin concentrations are correlated independently and inversely. Plasma leptin concentrations would decrease in men and men because of regular exercise

[17].

One of the most important reasons is that leptin is a hormone involved in cell metabolism and its dysfunction can be compensated by regular physical activity and increased sensitivity of hypothalamic cellular receptors [18]. The possible mechanism is that due to exercise leptin levels would decrease as a result of the sympathetic nervous system activity or by epinephrine available in blood circulation, while reducing the cellular volume of fat tissues and increase sensitivity of receptors to leptin [19]. Therefore, reduced production of leptin levels from adipose tissue due to through the endurance training it might be useful and important in the pathophysiology of obesity. In general, 12 weeks of moderate intensity aerobic exercise in the reduction of CRP and leptin concentration has a prominent role that may be effective in reducing weight and improving cardiovascular risk factors in obese men.

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