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Research Article

ANTI-INFLAMMATORY CYTOKINE ADIPONECTIN SECRETED BY ADIPOCYTES FOLLOWING ONE BOUT EXERCISE TEST

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ABSTRACT
Obesity is widely accepted as low-grade systemic inflammation and plays a key role in the pathogenic several chronic morbidities including type 2 diabetes, dyslipidaemia, atherosclerosis and hypertension. This study was aimed to determine acute response of serum adiponectin in adult men. For this purpose, thirteen sedentary adult obese men (39 ± 1.95 year, 93 ± 7 kg) were participated in this study by voluntarily. Blood sample were collected before and at the end of one exercise test consist of 40 min running in mentioned subjects. Statistical analysis used by Independent paired T-test. Data of statistical analysis showed no significant change in serum adiponectin between pre and post-exercise in studied subjects ($p = 0.32$). These finding indicates that one session exercise does not anti-inflammatory property in obese men.

Keywords: *Acute Exercise, Inflammation, Sedentary*

INTRODUCTION
It has already been discovered that obesity involves coronary artery disease (CAD), hypertension, type 2 diabetes, obstructive pulmonary disease, arthritis, and certain types of cancers. In addition, other problems, such as interrupted breathing during sleep, Liver cirrhosis, menstrual disorders and pregnancy anxiety are of the obesity-related complications and diseases (Campfield *et al.,* 1995; Vanltallie, 2002). Of course, the mechanisms through which such chronic diseases affect obese people are still unknown. World Health Organization (WHO) announces rapid growth of obesity as an epidemic. It also recognizes obesity as one of the major health problems in the world (Diabetes Group, 2002).

The role of different adipocytokines, as connecting factors of obesity and the chronic diseases associated with it, is of paramount importance b se the proteins secreted from adipose tissue affect insulin sensitivity, energy mechanism, and appetite (Kralisch *et al.,* 2007). Among adipocytokines, one-adipokine adiponectin is similar to collagen, which is mainly generated by adipose tissue (Aldhahi *et al.,* 2003). Such anti-inflammatory and anti-atherogenic cytokines are reduced in the presence of obesity and insulin resistance (Weyer, 2001). It has been discovered that systemic levels of this 224-amino acid peptide hormone is reduced in the presence of cardiovascular diseases and metabolic syndrome and it has anti-inflammatory and anti-diabetic characteristics (Hadaegh *et al.,* 2006). Adiponectin increases insulin sensitivity in muscle tissue and liver and oxidation of free fatty acids (FFA) in tissues such as muscle fibers, increases its systemic levels by reducing glucose, and reduces triglycerides (Calabro *et al.,* 2007). Today, adiponectin is known as a factor that promotes fat oxidation and glucose absorption in skeletal muscle and reduces liver glucose production (Tai *et al.,* 2010). Some studies also indicate changes of plasma concentration of adiponectin following physical activities (Ghanbari-Niaki *et al.,* 2008). They report the increase of its serum or plasma levels following long-term physical activities, especially the ones that accompany significant reduction of body weight (Racil *et al.,* 2013; Abd El-Kader *et al.,* 2013). However, the effect of one-session exercise tests on serum levels of these anti-inflammatory cytokines was not studied sufficiently. Based on the studies, the present research measures the effect of a one-session exercise in the form of running with moderate intensity in 40 minutes on levels of serum adiponectin on obese non-athlete males.ecau

MATERIALS AND METHODS

Subjects, Inclusion and Exclusion Criteria

Thirteen adult men aged 39 ± 1.95 year volunteered to participate in present study and underwent a 40 min acute ruining session at 65% maximal heart rate. After the nature of the study was explained in detail, informed consent was obtained from all participants. Participants were included if they had not been involved in regular physical activity/diet in the previous 6 months. Articles were selected from the initial search according to the following criteria: All subjects were non-smokers. Subjects with a history or clinical evidence of impaired fasting glucose or diabetes, active liver or kidney disease. The exclusion criteria also were infections, renal diseases, hepatic disorders, use of alcohol and exercise supplementation.

Anthropometric Measurements

Height was measured without shoes on standing while the shoulders were tangent with the wall. Body weight was measured in duplicate in the morning following a 12-h fast. Obesity was measured by body mass index (BMI). Waist and hip circumference were measured with a soft tape in the standing position following normal expiration. Waist circumference (WC) was measured at the superior border of the iliac crest and was taken to the nearest 0.1 cm after a normal expiration. Hip circumference was measured at the level of the greater trochanter, all parameters being measured by well-trained dietitians. Waist to hip ratio (WHR) was calculated as waist circumference divided by hip circumference. BMI was calculated as weight (kg)/height (m2).

Laboratory Assays and Exercise

Subjects were asked to avoid doing any heavy physical activity for 48 hours before blood sampling. Venous blood sample was collected from all the subjects before and immediately after exercise test. Exercise test lasted 40 min running at 65% maximal heart rate. The intensity of the activity of any person was controlled using the Polar heart rate tester (made in the US). Blood samples were analyzed for measuring serum adiponectin. Serum adiponectin was determined by ELISA method (Biovendor Company Biovendor Human Adiponectin ELISA, Czech) and the intra- assay and inter-assay coefficient of variation of the method were 4.4% and 5.8 respectively.

Statistical Analysis

Statistical analysis was performed with the SPSS software version 15.0. After assessment of the normal distribution by the Kolmogorov-Smirnov test, within group changes were compared by the paired t-test. A p-value of less than 0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION

Anthropometric and physiological characteristics of the study participants are described in Table 1. Data were expressed as individual values or the mean ± SD for groups. Main objective of present study was serum adiponectin in response to exercise test. Data of paired T test indicated no significant change in this anti-inflammatory by exercise test (p=0.32, Figure 1).

Table 1: Anthropometric characteristics, pre and post exercise test of studied subjects

	naeM	dtS. noitaeveD
Age (year)	39.15	1.951
Height (cm)	172.23	5.069
Weight (kg)	93.31	7.016
Abdominal (cm)	103.54	3.865
Hip (cm)	102.31	4.366
WHO	1.0123	.01328
BMI (kg/m^2)	31.41	1.070
Body fat (%)	32.82	1.295
Visceral Fat	13.54	1.330
Adiponectin pre (µg/ml)	5.808	2.2907
Adiponectin post (µg/ml)	5.508	2.9099

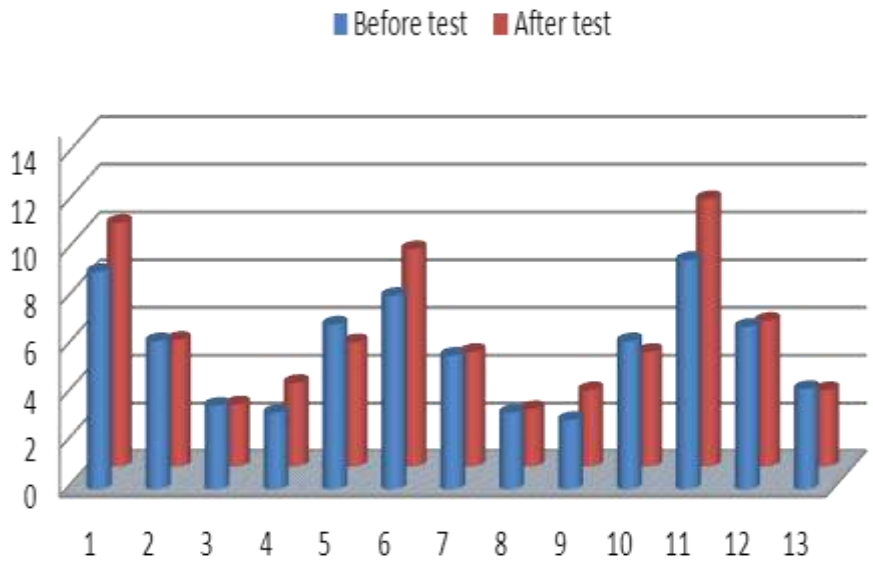

Figure 1: This figure shows serum adiponectin of studied subjects at pre and post test. No significant change was found between two values

Discussion

Findings of the recent study indicate lack of change of serum adiponectin levels in response to exercise tests. In other words, an exercise test in the form of running for 40 minutes with intensity of 70 percent maximum heart rate did not lead to any changes at serum glucose levels in the inactive obese males.

Since some cytokines affect fat and glucose metabolism and some studies indicate improvement of blood glucose profile in response to immediate aerobic exercise, this hypothesis discussed that changes of glucose levels in blood and/or fat have roots in significant responses of this cytokine such as leptin and adiponectin in response to immediate aerobic exercise. It typically indicates the effect of immediate aerobic exercise on levels of these peptide mediators. Meanwhile, findings of a recent study indicated significant reduction of levels of total plasma adiponectin following a physical activity in the form of a 20-min rowing in proportion to its resting levels (Jürimäe *et al.*, 2005). However, most studies in this field stated that serum or plasma adiponectin concentration is maintained following an intense one-session aerobic activity with 50 percent of maximum oxygen consumption. In some studies, the intensities are maintained without change in healthy people upto exhaustion (Punyadeera *et al.*, 2005; Bobbert *et al.*, 2007; Højbjerre *et al.*, 2007; Numao *et al.*, 2008). These studies pointed out that a one-session aerobic exercise with different intensities solely leads to intangible changes in its adiponectin and oligomers in healthy people.

To support these studies, findings of the present study also showed that execution of a running session with intensity of 70 percent maximum heart rate does not follow a significant change at adiponectin levels immediately after the exercise test. Consistent with the findings, a 45-min running with intensity of 65% VO2max on 9 obese males did not lead to any changes in adiponectin concentration immediately after the exercise test (Jamurtas *et al.*, 2006). The researchers pointed out that concentration of adiponectin in individuals is not affected within 48 hours after submaximal aerobic exercise. However, a one-session aerobic exercise with intensity of 55% VO2max in another study did not lead to any changes in plasma adiponectin concentration in overweight males (Højbjerre *et al.*, 2004).

Consistent with findings of the present study, findings of a recent study showed that a submaximal aerobic activity does not change adiponectin levels immediately, 24 hours, 48 hours after the exercise (Jurimae *et al.*, 2006). Lack of change of serum adiponectin in response to the exercise test in the present study might be attributed to the short duration of the test and/or its low energy consumption. In this concern, Bouassida (2008) stated in his review study that the one-session exercise activities shorter than 60 minutes do not lead to any changes in adiponectin levels (Bouassida *et al.*, 2010). Another study

pointed out that consumption of minimum 800 Kcal is required when doing exercises to improve levels of inflammatory/anti-inflammatory adiponectin (Bouassida *et al.,* 2010). Researchers reviewed the available findings in a study and concluded that an intense one-session exercise leads to adiponectin reduction; whereas, an exercise with moderate intensity does not follow any changes at adiponectin levels in middle-aged males with abdominal obesity (Shigeharu *et al.,* 2011). In another study, researchers stated that a 30-min continuous heavy running does not affect adiponectin concentration and its little increase is only due to changes in plasma volume (Kraemer *et al.,* 2003). In an overall conclusion based on the findings of present study and some hypotheses of other studies, it seems that lack of negative energy balance or relative short period of the exercise in this study are of the possible reasons of no adiponectin change of the exercise test.

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