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Research Article

EFFECT OF SINGLE SESSION OF CIRCUIT RESISTANCE EXERCISE ON VISFATIN AND GROWTH HORMONE IN MALE COLLEGE STUDENTS

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ABSTRACT

The effect of physical activity and exercise on disrupting negative energy balance is well documented. The body controls that with different functions such as activating the involved centers like central and boundary ones. The purpose of this study was to investigate the effect of single session of circuit resistance exercise with different intensities on visfatin and Growth hormone in non-athletic male college students. In this study, 30 volunteer non-athletic students were selected and randomly divided into three groups: the first group with intensity of 40% 1RM and the second group with 60% 1RM and the third group with 80% 1RM were doing exercise protocol. Blood samples were taken before and after the exercise program and the level of visfatin and Growth hormone were measured. The results of the present research have shown that plasma visfatin concentration significantly reduced after a session of a single circuit resistance activity with different intensities. But growth hormone was significantly increased in three groups. The results have shown significant reduction of plasma visfatin and significant elevation of growth hormone after a single session of circuit resistance exercise in non-athletic male college students.

Keywords: *Visfatin, Growth Hormone, Exercise, Circuit Resistance Exercise*

INTRODUCTION

The matter of weight adjusting and balance and cost of energy, appetite and getting the food have always been primary, important, functional and interesting subject for researchers and they are currently of the attention spot of lots of researchers (Hosoda *et al*., 2002). Fatness and overweight are often the problem of western societies that infected the health and wellness of society and in the last few years, in the developed countries are became to epidemic issues. So that with starting in younger ages, it followed by some disease such as cardiovascular disease and some kind of cancers and increase of death rate (McCall and Raj, 2009).

In addition of free fatty acids release, which was known as the most important cause of insulin resistance associated with fatness, adipose tissue is also an active tissue in producing a special protein called Adipokin or Adipocytokin. In fact, adipose tissue is not only an inactive source of body energy, but also is an active endochrine organ which produces biologic elements named adipocytokines (Bouassida *et al*., 2010).

Visfatin is a new adipocytokine which is discovered first by Fukuhara *et al.,* (2005) in visceral adipose tissue. Visfatin is produced in visceral adipose tissue, also it is found in skeletal muscle, liver, brain, osteon and lymphocytes. Visfatin was known as Beta Precell Increasing Factor (PEBF). Nowadays, considering Enzymatic action of that is named Nicotine Amid Phosphoribos Transferase which seems to play an important role blood glucose regulation (Fukuhara *et al*., 2005).

This protein with 52-55 kd weigh is more expressed in visceral adipose tissue than subcutaneous adipose tissue. Visfatin has semiinsuline function and causes glucose removal stimulation. In adipose tissue and myositis, inhibits glucose release from liver (Sethi, 2007). Visfatin attaches insulin receptors in a position

except insulin receptor reception. Also visfatin can be produced by macrophages and neutrophils (McGlothlin *et al*., 2005).

Several studies had done around visfatin response to exercise in human; for instant Haider et al. had shown effects of aerobic exercise on visfatin level of 18 patient (11 women and 7 men) dealing with type I diabetes. Schedule included four mounth exercise on ergometer sever as 60-70pecent heart beat potential and for one hour each stage. Visfatin level decreased in test group after 2 and 4 months exercise and remained for 8 months after experiment, but BMI, fasting blood glucose, glycated hemoglobin and lipoproteins had no changes (Haider *et al*., 2006).

In the other study Choi *et al* (2007) was surveyed the effect of combination aerobic and resistant exercises on plasma level of 48 non-diabetic 55-50 years old women with overweight or fatness. Cases was inactive that normally used to do sport 20 minutes a week. Exercise program included 5 sessions a week for 12 weeks. In each session, 45 minutes aerobic activity and 20 minutes resistant activity. After 12 weeks of exercise, cases lost 4-5 kilogram weight also fat percent, lumbar circumstance, fasting glucose and visfatin level decreased. So the combination of aerobic and resistance exercises with weight loss program significantly reduced the levels of visfatin plasma of healthy overweight women. Bo *et al.,* (2009) described that plasma visfatin decreased after a year intervention in a healthy life pattern including diet change and sport exercises.

Overall aerobic sports can have useful physiological changes, including weight lost, improvement glucose tolerance and insulin sensitivity. Also it is known resistant activities are an important part of sports to reduce effect of metabolism energy (Coyle, 2000). The present research is designed for consideration of plasma visfatin and growth hormone levels response to different resistant activity protocols in healthy male students.

MATERIALS AND METHODS

Before administrating this study, the researchers obtained approval from the ethical committee of Shahrekord University of Medical Sciences, Iran.

Research Design

The present study was a semi-experimental and basic survey which included pretest and posttest with three experimental groups, that statistic society were non athlete male university students. 50 Volunteers students were accepted in first step after recalling, among them 30 people had factors to take part in the research and they've been chosen. Smoking, taking any food complements, having special diet, diseases such as cardiovascular diseases, respiratory and kidney problems and metabolic disorder were exclude criteria. Cases prevented any regular exercise with dumbbell during study period. Written agreement was taken from every case after primary choice. Cases were dividing randomly in 3 groups with severity of 40%, 60% and 80% with 10 cases in each group. We asked all groups to join 3 exercises a week in different days to get familiar with exercise atmosphere and prevent negative effects of body activities on cases and after 72 hours, the main exercise started.

Circular Resistant Activity Structure

In this study, the structure reported in previous researches (Gualillo *et al*., 2006) for circular resistant activity was used and a session of resistant activity with dumbbell occurred, that exercise includes 10 stations that each station was one activity (body extension, 90° scot, laying chest press, knee flexion, standing shoulder press, forearm halter, foot press, hind arm halter, dead lift, sitting paddle) each action 30 sec without rest between stations which is done in 3 phases. Cases were allowed to take a one minute inactive rest between each time. Cases had 10 minutes mild tensional movement with low severity for body warming and total time of each session was 27-30 minutes.

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Case Blood Sampling

Blood samples were obtained from humeral vain in sitting position of 3 groups before starting and immediately after finishing exercise. Cases were asked to avoid eating from 9o clock of previous night to sampling time, but they were able to drink. Test was started in 08:00 in the morning and ended at 11:30 in the morning to avoid day rhythm changes of peptide. EDTA added samples were collected and transferred to the lab using ice canteen, and centrifuged for 10 minutes at 3000 rcf/min and separated plasma of each sample was conserved in some different microtubes and transferred to -80˚C for further measurements. Plasma visfatin and growth factor were measured using ELISA technique by special kits; Cristal Di Biotech and Mono Bind companies respectively.

Statistical Analysis

Using Shapiro test and data distribution checking showed that data has a natural distribution. So, parametric tests were used. Also for before and after treatment comparison, we used T-test. For analysis SPSS16 software was used and P Value more than 0.05 was accepted as significant difference.

RESULTS AND DISCUSSION

The Results

Physical characteristics of subjects in groups of 40, 60 and 80% before and after resistance training are shown in Table 1. The analysis of data shows that there were no significant difference population in terms of age, height, weight and BMI.

Based on the results presented in Table 2, the visfatin levels (Pg/mL) in 3 groups are reduced significantly after single session of circuit resistance exercise ($P \leq 0.05$).

But growth hormone levels (ng/L) are increased in 3 post-test subjects ($P \leq 0.05$).

Table 1: The mean (SD) age, height, weight and body mass index in groups of 40, 60 and 80%

Group %80	Group %60	Group %40	Variable
23.44± 0.52	1.32 ± 22	22.67± 1.22	Age(year)
176.5± 5.41	173± 3.9	170±3.74	Height (cm)
76.89± 8.16	68.56± 5.24	7.01± 64.22	Weight (kg)
24.75±2.01	22.88± 1.04	2.11 ± 22.2	BMI

Table 2: Plasma visfatin and growth hormone (mean ± standard deviation)

Group %80	Group %60	Group %40	Variable
474.50±176.68	466±95.94	453.40± 60.08	Visfatin before the test
410.17±149.43	407.67±87.82	433± 66.74	Visfatin after the test
0.06±0.12	1.08±1.3	0.1±0.01	GH before the test
23.22±1.19	11.8±1.16	34.4±1.25	GH after the test
0.01	0.02	0.03	P values visfatin
0.007	0.02	0.01	P values GH

The amount of $P \leq 0.05$ was considered statistically significant Mty.

Discussion and Conclusion

The purpose of this study was to investigate the effect of single set resistance training circle with intensity of 40%, 60% and 80% 1RM respectively on plasma visfatin and growth hormone levels. The results showed that a single bout of resistance exercise in circular significantly decreased plasma levels of visfatin and a significant increase in growth hormone levels. This study is probably the first study of plasma visfatin level response to resistance exercise with different severity.

Background check on visfatin studies show that various researchers demonstrated the acute and long-term effects of aerobic exercise with endurance activities and programs on visfatin. Choi *et al.*, (2007) reported the reduction of visfatin after 12 weeks of resistance exercise training but because of the long term training the results of that study can't be compared with present study.

In the other hand different results were taken in studies with effect of acute body activity on visfatin. For instance, haven't seen any changes in plasma visfatin level after acute exercise (Frydelund *et al*., 2007). But Jurimae *et al.*, (2011) expressed visfatin reduction after 2 hourse paddling and Ghanbari-Niaki *et al.*, (2010) reported evaluation of visfatin after aerobic activity.

In studies which are done on body activity effect on visfatin, different result were cached, and some of them are not similar, but most procedures show visfatin reduction in response to resistant activity. In the present study, the theory was that a single resistant activity session, involve main body muscle activity and consume huge amount of energy which may be necessary to detect plasma visfatin. So that; resistant training protocols are designed for taking part the big main muscles during activities. Big volume working muscles during activity makes a bigger negative energy balance which probably can be enough to make meaning full changes in appetite factor concentration. Because of anaerobic resistant activity nature, energy sources used in this activity are phosphate, muscle glycogen and blood glucose. In the similar studies muscle glycogen source reduces up to 20 to 40 percent at the end of resistant activity (Jamshidi *et al.*, 2014). Different researches showed that dumbbell practice leads to increase glycogen lyses and energy ratio reduction and after heavy exercises protein synthesis and glycogen reproduction happen slowly (Ghanbari-Niaki, 2006). On other hand, it has been expressed the resistance activity, especially exogenesis contraction leads to muscle hurt and glycogen resynthesize malfunction. Also human and animals studies showed that muscle glucose transporter protein 4 (CLUT4) and muscle glycogen is related directly (Clarkson and Hubal, 2002). Each resistance protocol has different severity, exercise volume and break between turns which are the effective causes in determination of energy cost during resistant activity (Meirelles and Gomes, 2004), and have various hormonal and metabolic response (Izquierdo *et al.*, 2009). They have showed that the number of set may differentiate long-term adaptations with maximum strength, muscular hypertrophy, and strength endurance protocols causing individual hormonal responses.

Karmer *et al.*, (1990) studied some hormone concentration changes in response to 6 different resistant activity protocols, more growth factor and cortisol and lactate produce in response to hypertrophy protocol rather than other resistant activity protocols. On the other hand, Karlicsh *et al.*, (2005) showed that growth factor reduces visfatin expression in fat cells in a meaningful way. So, maybe more plasma visfatin reduction in response to resistant-powerful protocol and hypertrophy rather than powerful protocol, is because of higher growth hormone production. Generally, it can be said sever exercise causes ATP, muscle and liver glycogen reduction (Kraemer *et al*., 2004). So, exercise and body activity disturb energy balance and hemostasis in myocytes and increases cell supplication of energy.

It seems the present research cases negative energy balance due to sever resistant exercise, which can be because of muscle ATP Reduction due to purine constantly lost from muscles (Matsubara *et al*., 2004). However visfatin function is not completely understandable but studies reveal that visfatin can have multiple actions; the first one is autocrine-paracrine which simplifies fat cell accumulation in visceral adipose tissue. The other one is endocrine action which modifies insulin sensitivity in peripheral organs, so visfatin can be effective in glucose hemostasis. On the other hand, it can cause fatness (Sethi and Vidal-Puig, 2005). Generally, taken different results in various papers can be because of many factors

such as body fat amount and its distribution also fasting situation during study, body weight and body condition. Exercise schedule and even time of blood sampling, inflammation condition, kidney function, hormones, and diet can be other causes (Pagano *et al.,* 2006; Berndt *et al.,* 2005).

General Conclusion

The result of this study shows that plasma visfatin concentration after single circular resistant exercise with 40%, 60% and 80% 1RM severity decreases meaningfully in non-athletic male students; but growth hormone concentration has meaningful increase in three groups. There is a need of further studies on more cases in this field to get better result. It should be said hormonal changes specially appetite hormones and related factors are really hard complicated for studying because of large variety changes of appetite hormones response to different conditions. So there are lots of unanswered questions in this case, hopefully the result of this study to be a clue of further researches.

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