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Research Article

THE EFFECTS OF A RESISTANCE TRAINING PERIOD ON REACTING PROTEIN C AND YOUNG WOMEN RESISTIN

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ABSTRACT
The aim of the current study was to determine the effects of a resistant training period on resting levels of reacting protein C, and young women resistin.20 samples that have been studied, were randomly divided into 2 groups: resistant exercise and control. Blood samples were taken from objects, 24 hrs before the beginning of exercise and again, 48 hrs after the end of exercises. To check and compare the changes of variants, one used variance analytic test with re-measurement. In resistant exercise; weight, body mass index (IMB) and CRP significantly decrease (respectively P=0.019, P=0.02 and P=0.001), while resistin had no significant change (P=0.23).Probably with decreasing CRP, resistant trainings play an important role in women inflammation deduction.

Keywords: *Inflammation, CRP, Resistin, Resistant Training, Cardiac Risky Factors*

INTRODUCTION
Today's, cardiac diseases is one of the important factors. Especially in developed countries, and include 40% of death rate in world annually. Recently cardiac diseases have increased due to passive lifestyle (Blake and Ridker, 2002).
Inactive lifestyle has involved developed countries and it is still increasing. One of its side effects is prevalence of cardiac diseases and unripe death (Cinteza *et al.,* 2007). Blood resistin quantity increases in systematic inflammation and known as one of the syndromes for atherosclerosis (Boström *et al.,* 2009). Resistins are good incitement for synthetics and pre inflammatory cytokines secretion (Kadoglou *et al.,* 2007; Weikert *et al.,* 2008; Reilly *et al.,* 2005), and is one of the important factors for heart diseases prediction (Athyros *et al.,* 2010). Hyper resistin may defect glucose tolerance and increase resistivity to insulin in liver, so may defect insulin activity. Altogether strong amount of resistin have a straight relationship with inflammation (Reilly *et al.,* 2005; Athyros *et al.,* 2010).
Different studies have been done on the effects of long time exercises on resistin values (more than 6 weeks). Reconsidered to various objects, including body type and different exercise time and intensity, there are some paradox results (Heilbronn *et al.,* 2004; Huang *et al.,* 2005; Jones *et al.,* 2009). Jones *et al.,* (2009) with partners has observed significant decrease in resistin serum and non-changeable resistivity to insulin, in fat adults, after an 8-month-aerobic exercise. Simultaneously Ping *et al.,* (2007) and Kadoglou *et al.,* (2007) have shown significant decrease either resistin or resistivity to insulin, after aerobic exercises. On the other hand, Monzillo *et al.,* (2003) have observed non-changeable resistin and increasing sensitivity to insulin after a 6 - month-body activity with mild intensity. Also acute phase protein (CRP) has been built by liver and fat fiber in response to accumulation of inflammatory cytokines, meanwhile it itself has inflammatory property and is a strong risk factor for cardiac diseases, blood pressure and apoplexy (Athyros *et al.,* 2010; Donges *et al.,* 2010).
Increasing in CRP values in at least 3 mechanisms (Lagrand *et al.,* 1999; Pasceri *et al.,* 2000) cause development in atherosclerosis. Donges *et al.,* (2010) have studied the effects of aerobic exercise or resistance on CRP, and body composition in 3 groups (aerobic, resistant and control) in 10 weeks. The results showed a significant decrease in CRP in both groups. Also, basically CRP related with aerobic fitness reversely. Also Stewart *et al.,* (2007) studied the effects of a 12-week-combination plan (aerobic and resistant) on CRP on 29 young men (18-35 yrs old), and concluded that maximum consuming oxygen and muscularly strength increased in exercised group. And CRP value decreased with exercise. Some

other surveys resulting indicate that training plans have no effect on inflammatory such as CRP (Marsell *et al.*, 2005; Khaodhiar *et al.*, 2004).
The aim of the current study was to determine the effects of a resistant training period on reacting protein C and resistin on young women.

MATERIALS AND METHODS

Subjects

20 healthy women with age of 26.7±3.88 and height of 167±1 and other necessary conditions (no disease or surgery, no consuming medicine ,and physical health with once a week exercise) were chosen randomly and divided into 2 groups of exercising and control (each groups includes 10 people).

Methods of Data Collection

The objects got familiar with study protocols, a week before the beginning of the test. In that session, objects have been gotten resistant motions, moreover, their general features have been measured .They attended in sampling session, 24 hrs before the beginning of exercise and resting blood samples were taken from the 3 groups. Then exercise object group performed their exercise plan in 8 weeks. The control group had no body activity in this period and just did their daily activities. The objects of those groups attended in sampling session and resting blood samples were taken, 48 hrs after the last session.

Training Program

Exercises were 3 sessions a week during 8 weeks, and every session includes 10 minutes warm up, main exercises and 5 min cool down. Resistant training plan includes bench press, Scott, underarm stretching, instep, with 65-85 % maximum replay (1 RM) and was 8-12 motions in 2-4 sections that were performed in 3 sessions a week during 8 weeks. These motions were performed circular. There were rest time in these motions, 60-90 seconds between every station and 2-3 min between every round. The increasing load process in these groups were simple stairs form , to prevent over-exercising and doing a mid test, a decreasing load period was used by the end of 4th week. First 4-week-resistant training plan was based on a maximum replay of objects in pretest, while second 4-week-resistant exercise plan was based on a maximum replay of objects by the end of 4th week. Training time of this part started 16 min in first week to 30 min in 8th week.

Collection and Analysis of Blood Samples

5cc blood sample was taken from middle vein. Blood samples were poured into sterile tubes contained K3EDTR. Heparin and EDTR tubes were put into ice then stayed in environmental temperature a couple of minutes.
Then serum was separated from plasma by a 300 RPM centrifuge in 10 min. All blood samples were kept under -20 C and were using in test time. Resistin was measured with 0.01 nanogram/ millimeter sensitivity by Elisa method using Ray Bio Human Elisa kit. Reacting protein C was measured with 10 ng/mm sensitivity by Elisa method (Elisa kit, Ontario, Canada).

Statistical Methods

Primarily, every value of study variances were described by average scale deviation and to investigating natural distribution and using parametric or non-parametric tests, one used Smirnov - Kolmogorov test test that results showed, data has natural distribution. To compare the changes of study variances in both training groups and to control before and after 8 weeks , one used factor variance analysis test with re-measurement in a 2*2 plan (2 groups and 2 times) .For every statistical test, a meaningful level (0.05) was considered. Also, one used statistical software (SPSS) V.16 to compute statistical calculations.

RESULTS AND DISCUSSION

Table 1 illustrates weigh statistical description, body mass index (BMI), CRP and serum resistin. Values are reported in average and scale deviation. Also, to compare the changes of variances between 2 groups, factor variance analysis results with re-measurement are presented in tables 2,3,4,5. Weigh, BMI and CRP are decreased significantly in training group in compare with control group (respectively P=0.019, P=0.02, P=0.01). However, resisrin decrease a little in training group but it was not significant (P=0.23).

Table 1: Variances statistical description (scale deviation ± average)

Variables	Sampling Times	Training Groups	Control Groups
Weight (kg)	Before Training	67.10 ± 3.54	64.50 ± 4.37
	After Training	66.40 ± 3.59	64.90 ± 4.79
BMI (kg/m^2)	Before Training	23.89 ± 0.52	23.45 ± 0.84
	After Training	23.64 ± 0.54	23.56 ± 0.94
Resistin (ng/ml)	Before Training	8.50 ± 1.77	7.90 ± 0.73
	After Training	8.80 ± 1.39	9 ± 1.63
CRP (ng/ml)	Before Training	1910.90 ± 497.66	1307.90 ± 440.26
	After Training	1915.40 ± 473.03	1902.10 ± 447.42

Table 2: Statistical results of factor variance analysis test with re-measurement in order to compare weigh changes in 2 groups

Factor	F	P
Time	0.49	0.49
Group	1.26	0.27
Time*Group	6.60	0.019 *

**The mean difference is significant at the 0.05 level*

Table 3: Statistical results of factor variance analysis test with re-measurement in order to compare BMI changes in 2 groups

Factor	F	P
Time	0.91	0.35
Group	0.65	0.43
Time*Group	6.24	0.02 *

**The mean difference is significant at the 0.05 level*

Table 4: Statistical results of factor variance analysis test with re-measurement in order to compare resistin changes in 2 groups

Factor	F	P
Time	0.37	0.54
Group	1.57	0.22
Time*Group	1.51	0.23

Table 5: Statistical results of factor variance analysis test with re-measurement in order to compare CRP changes in 2 groups

Factor	F	P
Time	318.75	0.001 *
Group	2.08	0.16
Time*Group	291.83	0.001 *

Discussion

According to current study, 8 weeks resistant training causes decrease in reacting protein C in young women, but does not have significant effect on resistin. Olson *et al.*, (2007) investigate CRP concentration on 16 over-weight women after performing resistant training in a year, and resistant training causes decrease on participant's body mass, fat percentage and CRP plasma concentration, that is acceptable with current study. Improvement of endothelial and blood mono nucleus cells decreasing, are performances of CRP decreasing after exercise (Strasser *et al.*, 2010).

We can discuss more about the instructions which in, regular sport activities cause improvement in CRP level. A potentially main method may be interleukins. According to documents, TNF-a and IL-6 factors

are released in considerable values from fat fiber, especially gut fat. Their releasing from fat fibers are increasing by sympathetic stimulation, and from where regular body activity cause adjust decreasing in sympathetic stimulation, it is possible to decrease in TNF-a splash (means strong stimulating in producing IL-6) (Christopherson, 1999).

In this study cytokines including IL-6 have not been measured, but measuring them may be an idea for future surveys. In many conditions, body activity as a good model in study of inflammatory responses, can be effective in CRP serumic values changing, which main surveys notify decreasing in CRP resting concentration and consisting with long time body training (Gomes *et al.,* 2010). About resistin, current findings are the same as Jorge *et al.,* (2011) study about non-change resistin levels after a 12 -week-synthetic training plan. They included small number of objects and proper condition of samples in metabolically control in base conditions, for above results. We cannot have a precise judgment about the results of current study, but we can conclude; because, resistin serum level is controlled by type of nutrition and also alimentary limits cause decrease in resistin messenger gene, it is possible non-change resistin current study through the object's diet (Nogueiras *et al.,* 2003).

In current study, the object's diet is the only reminder of alimentary control by a 24 hrs questionnaire, and objects used their regular diet without special diet prescription. On the other hand, this hypothesis is in discuss that, serum resistin in humans mainly is synthesized through inflammatory cells such as mono sits and macro phases and leak into blood flow, and it itself may synthesize resistin fat fiber, however a little (Osawa *et al.,* 2007), by this reason, may be loss of weight and body mass index have no effect in resistin serum in current study.

Conclusion

According to recent discoveries , one concludes that an 8-week-resistant training like the current protocol, causes decreasing in CRP ,but it also cause non-resistin in young women. Probably resistant training by decreasing CRP plays an important role in reducing inflammation in these women. Therefore, more studies with more objects and controlling other effective factors are offered. Also, increasing training duration can be considered in following surveys.

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