Effect of 8 weeks Rhythmic aerobic exercise on serum Resistin and Body Mass Index of overweight and obese women

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Abstract

Resistin plays an important role in obesity-related diseases through metabolic processes and the immune system. The purpose of this study was to evaluate the effect of 8 weeks aerobic exercise on the amount of resistin and the Body Mass Index (BMI) of overweight women. This study was carried out through semi-experimental method. To this end, 34 overweight and obese women (aged 40±10, BMI≥25) participated in the study voluntarily and were randomly divided into experimental (17) and control (17) groups. The experimental group started the 8-week exercise program performed in three sessions a week (51 minutes per session) with 66% of the maximum heart rate in the first week which gradually and along with the exercise progression increased to 86%. Training sessions began with warming up then continued with the main part of the exercise including low impact and high impact aerobic moves in the standing positions and then back to the sitting initial position. The exercise (experimental) group participated in an 8-week training program (3 sessions a week) while the control group was asked to keep their normal life during the study period as it was before. Blood samples were taken in two stages, first 48 hours before the tests and second 48 hours after the last aerobic training session. Serum resistin concentration was calculated through ELISA (enzyme-linked immunosorbent assay) method using its special kit. The Shapiro-Wilk test was used to determine the consistency and nature of information about the subjects in the research groups. In order to analyze the data, the paired t-test was used to examine the intra-group differences and covariance test at a significant level of P≤0.05 was performed to measure the inter-group differences. SPSS21 software was also used to conduct statistical calculations. Data analysis indicated that the 8-week exercise program had a significant effect on BMI (P=0/001), body weight (P=0/000), and resistin (P=0/001). In addition to reducing weight and lowering BMI, aerobic exercise can also decrease resistin levels in overweight and obese women which can be indicative of a lower risk of developing metabolic and cardiovascular diseases.

Key words: aerobic exercise, resistin, body mass index, overweight

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Introduction

Today, both developed and developing countries are facing a lifestyle of low physical activity spreading among people, which is normally followed by some side effects such as increased prevalence of cardiovascular diseases and early mortality (1). In most cases, premature coronary artery diseases are directly associated with the number, severity and acquiring of atherosclerosis factors (2). Adipose tissue is not just an energy saver, but can also play an important role in insulin resistance through production and irregular discharge of a number of proteins called adipocytokines (3).

Adipocytokine resistin weighs 11.3 kDa (4) and belongs to the cysteine-rich protein (CRP) family called resistin-like molecules also known as and found in inflammatory zone-2 (FIZZ-2) (5,6). This hormone is also directly related to atherosclerosis risk (7). Increasing level of resistin occurs mainly in inflammatory conditions which stimulate and relieve proinflammatory cytokines (8). Little research has been done on the effect of physical activity on resistin levels. Jamurat et al (2006) reported that a sub-intensive aerobic exercise session in healthy and overweight men did not make any significant changes in resistin levels (9). In their study, Jones et al (2009) examined the effect of 8 months of aerobic exercise on resistin levels and lipid profile and suggested that the exercise lowered resistin levels (10). Balducci et al (2009) indicated that resistin decreases in diabetic and overweight patients after 12 months of regular physical activity (11). In another study, Juan et al (2007) revealed that 8 weeks of aerobic exercise had no significant impact on serum resistin of obese people. Resistin expression in adipocytes decreases in fasting condition and increases with nutrition. They also declared that exercise would not reduce resistin in the absence of weight loss (12). Dastani and colleagues reported that 8 weeks of aerobic exercises with an intensity of 50-60% of maximum heart rate resulted in a significant decrease in body composition and a significant increase in serum resistin of subjects (13). While Rashid Lamir et al (2013) found that 8 weeks of aerobic exercises with an intensity of 70-80% of maximum heart rate in active women led to a significant increase in resistin and a significant reduction of their body composition (14). Such contradictions in research results can be influenced by various factors such as amount of fat and its distribution, inflammatory conditions, hormones and other factors including the type and intensity of exercise. Therefore, there is a need for further research to better understand the factors controlling the synthesis and release of resistin and to clarify its role. It is also not clear whether changes made in adipose tissue by exercise can reduce resistin or not. Given little research conducted on the effect of long-term exercise on serum resistin levels and the importance of examining this new adipokine in obese people as well as increasing interest of women in aerobic exercises, this study aims to investigate the effect of 8 weeks aerobic training on resting levels of resistin and some metabolic risk factors in obese women.

Materials and Methods

After recall papers were distributed among women of the population from Zahedan, 34 overweight and obese women were selected voluntarily and through convenience sampling method on the basis of inclusion/exclusion criteria. Inclusion criteria were 1) being overweight or obese (BMI≤25), 2) a minimum age of 30 and a maximum age of 50.

Research exclusion criteria were 1) having cardiovascular diseases, severe hypertension, type 1 and 2 diabetes, thyroid-related diseases, 2) taking medicine, 3) smoking and alcohol use, 4) lack of participation in any regular exercise program during the past 6 months. Subjects had no particular diet during the research period. Because of the experimental nature of research and observance of ethical principles, the consent form for participation in the study and medical record questionnaire were completed by subjects. Then, subjects were randomly divided into two exercise (experimental) (17) and control (17) groups. The exercise group participated in an 8-week training program (3 sessions a week) while the control group was asked to follow their normal life routine during the study.

The exercise program included 8 weeks of aerobic training consisting of 3 sessions per week, 51 minutes per session which started with 66% of the maximum heart rate during the first week and gradually increased up to 86% as the training process progressed. Each training session consisted of warming up (stretching and running slowly for 11 minutes), the main part including low impact and high impact aerobic moves in standing position (41 min) and returning to the initial seated state (11 min). It should be noted that the control group did not attend any regular exercise activity during the research. The maximum heart rate of participants was calculated using Polar heart rate monitor. The exercise protocol was performed in an indoor sport hall with suitable ventilation system at the same temperature and for the same hours all 8 weeks.

Blood samples were taken from participants at the laboratory between 5 to 8 in the morning while fasting over two stages, first 48 hours before the tests and second 48 hours after the last aerobic session in order to exclude the effect of the exercise. Resistin serum concentration and lipid profile were measured using Human resistin ELISA kit made by EASTBIOPHARM Co., and Pars Azmoon kit according to the manufacturer's instructions.

The Shapiro-Wilk test was employed to determine the consistency and naturalness of information about the subjects in the research groups. In order to analyze the data, the paired t-test was used to examine the intra-group differences and covariance test at a significant level of P≤0.05 was employed to measure the inter-group differences. SPSS21 was also used to perform statistical calculations.

Findings

As shown in Table (1), there was no significant differences between subjects in terms of age, weight and body composition before the research protocol was implemented. Data analysis implied that the 8-week exercise program had a significant effect on BMI (P=0/001), body weight (P=0/000), and resistin (P=0/001).

Table 1. The average variables for the control and experimental groups in the pre and post-test

Variable	phase	control group	experimental group
Height (cm)	Pre-test	161.1±5.1	160.2±6.6#
Age (year)	Pre-test	39.7±6.2	37.1±7.3
Weight (kg)	Pre-test	75.6±9.2	80.7±9.7
	Post-test	75.6±8.9	78.8±9.7#*
BMI (2kg / m)	Pre-test	29.1±2.4	31.4±2.8
	Post-test	29.1±2.3	30.7±2.9#*
resistin (mg / dl)	Pre-test	8.38±0.84	8.09±0.75
	Post-test	8.34±0.81	7.22±0.5#*

a Data are shown as mean ± standard deviation.

T test for dependent samples is significant (significant difference in the experimental group before and after 8 sessions) ($p < 0.05$).

* Covariance test is significant (significant difference of groups' post-test after eliminating the effect of pre-test) ($p < 0.05$).

Discussion and Conclusion

The results of this study revealed that BMI and serum resistin levels decreased significantly after 8 weeks of aerobic exercise. Such change made in resistin levels has also been reported in many previous studies. In one of them, 16 weeks of regular aerobic exercise at 50% to 85% VO2MAX intensities in overweight patients with type 2 diabetes resulted in a significant reduction of resistin (15). Further, 8 months of regular aerobic exercise of overweight adolescents led to a significant reduction of resistin level (16). The results of the present research was not consistent with Persephin et al (18) and Juan et al (12). Thus, it can be stated that changes in resistin amounts result from physical exercises. Contradiction between the present article and other studies can be attributed to differences among exercise interventions (duration, type, intensity) as well as subjects. In the present study, body weight changes of the training group were directly related to resistin changes. As a matter of fact, a significant reduction of body weight after exercise was associated with a decrease in resistin level. In some other studies, it was confirmed that aerobic exercise affects weight loss and subsequent resistin decrease as factors contributing to increased insulin function and reduced insulin resistance (18,19). Youn et al (2004) reported that 2 months aerobic exercise resulted in weight loss which caused a significant decrease in resistin (18). As can be seen, none of the studies mentioned above have been similar in terms of exercise intensity and duration.

Increasing resistin gene expression disrupts the muscle's glucose metabolism and raises glucose intolerance. Therefore, resistin may have a crucial role in insulin resistance or glucose homeostasis (20). However, the physiological effect of resistin on resistance and obesity has not been clarified yet (21). Moreover, some researchers have suggested that resistin is directly correlated with body mass index, body fat and glucose and insulin in obese people (21,22). Some previous studies have pointed to the impact of a healthy, balanced diet along with a regular exercise program on reducing blood resistin levels as well as lowering fat mass due to weight loss in response to the diet and physical training which ultimately results in a decrease in serum resistin (23). Generally speaking, long-term physical exercise seems to reduce the amount of resistin as it decreases body fat percentage and BMI. All controversies in articles may be caused by failure to significantly lose weight, people's different and incontrollable genetic backgrounds, differences in type, intensity and duration of exercises or subjects participating in the studies.

The findings indicate that serum resistin concentrations are improved after 8 weeks of aerobic exercise which result in reduction of body mass index. Adipokine ideal levels can play an important role in preventing cardiovascular and metabolic diseases. Overall, the results of this study bring us to the conclusion that continuous aerobic exercise not only results in weight loss but also reduces serum resistin of overweight women which can help us reach a better understanding of the role of regular physical activity in lowering the risk of developing cardiovascular diseases and diabetes, although, more research is needed to be conducted on its long-term effect.

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