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ORIGINAL ARTICLE

Effect of 12 weeks Aerobic Exercise on Osteocalcin and Bone Density Indices in Overweight Women

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ABSTRACT

Obesity is one of the major and most common metabolic disorders in all countries of the world, especially industrialized countries. Obesity has many consequences and complications, including metabolic diseases such as diabetes, metabolic syndrome and cardiovascular disease. The aim of this study was to evaluate the biochemical parameters such as vaspin, insulin and blood glucose in the blood of overweight women aged 35 to 45 years. Materials: In this study, 20 overweight women aged 35 to 40 years who

They were divided into two separate experimental and experimental groups. After 12 weeks of continuous aerobic exercise,

The mentioned indicators were measured. Results: In this study, it was found that there is a significant relationship between aerobic exercise and the amount of biochemical indicators of the body and the amount of body mass index of these women. Conclusion: According to the results of this study, it can be concluded that having a proper nutritional pattern along with proper exercise, including aerobic exercise, can play a very important role in reducing diseases such as obesity. And have subsequent effects.

Keywords: Vaspine, Aerobic exercise, Insulin sensitivity, Glucose resistance

INTRODUCTION

Today, machine life and inactivity have turned our bodies into a reservoir of unreleased stress. Lack of a natural opening for the release of stress leads to muscle weakness and thinning, and we will no longer be able to use our energy for life, resulting in inactivity, muscle weakness, and accumulation of fat and waste products in the body with the appearance of obesity. If people in the community do not prevent and treat it, it can become a health and social problem. This disease has several causes. Lack of physical activity combined with overeating in both adolescents and adults will lead to obesity, although some people become obese due to genetic factors and some due to diseases such as hypothyroidism. Exercise and overeating stimulate the formation of adiposity (fat cells) (Kanazawa et al, 2005).

Therefore, obesity is a combination of the number of adipose tissue and their fat content. Obese people have a large number of fat cells that contain more fat than their lean counterparts. Vaspin is one of the most important hormones in the human body, which is widely associated with obesity and other related factors. It is also important to know that one of the diseases associated with obesity is diabetes (Haslam and WP, 2005). Diabetes has different types, in this disease, different signs and factors lead to physiological abnormalities, including disorders. Observable abnormalities in this disease are glucose tolerance and insulin resistance, which are the subject of many studies today. Obesity and thus reduced risk of various related diseases (Bleich et al, 2008). In previous years, scientists thought that adipose tissue was ineffective and acted only as a store of triglycerides. But today it is clear that adipose tissue is an active endocrine system that is associated with high metabolic activity and produces fatty acids and the secretion of several proteins that regulate hormones that absorb and consume energy. Adipose tissue expresses more than fifty active metabolic and hormonal factors. Some of these hormones are generally called adipokines. These adipokines play an important role in the process of inflammation and atherosclerosis (Haslam, 2005). Dangerous diseases increase the risk of various diseases such as cardiovascular attacks, osteoarthritis, type 2 diabetes, high blood pressure, etc., and ultimately reduce life expectancy and premature death (Woodhouse, 2008). Having a proper diet with a regular exercise program and in accordance with the exact scientific principles is one of the most important and effective ways to reduce the risk of obesity and subsequent other diseases. Physical activity, including aerobic exercise, also plays a very important role in burning fat and reducing obesity problems (Pollack, 2013). Factors in reducing the rate of obesity, especially abdominal obesity, regular physical activity and diet are desirable. These factors increase insulin sensitivity, lower blood pressure and improve blood lipid profile to prevent chronic diseases. It is better to know that the introduction of appropriate exercise programs, optimal nutritional patterns and lifestyle changes and increase its quality can reduce the risk of vascular disease. Aerobic exercise on fat metabolism in healthy people with normal weight, the potential benefits of exercise on fat metabolism in middle-aged people have received less attention. In this regard, studies have shown that physical fitness program has a significant impact on fat metabolism in middle-aged people (Weinstock, 2013).

Some studies have shown a positive effect of exercise on fat reduction. Shahdadi and Molaei (2016) in a study entitled "Effect of 8 weeks rhythmic aerobic exercise on vaspin levels and lipid profile in overweight obese women" examined the physiological effects of aerobic exercise on vaspin secretion in these women and showed that There is a significant relationship between the amount of aerobic exercise and the amount of vaspin secretion and body mass, so with increasing the duration of regular exercise, we see a relative improvement in physical condition and regulation of the secretion of this hormone (Shahdadi and Molaei 2016). Bani Talebi et al. (2016) in a study entitled "Comparison of the combined effect of eight weeks of training) endurance and resistance (at different levels of inflammatory factors and adipokines in elderly women" to examine the effects of endurance and resistance exercise on different levels of hormones And inflammatory factors secreted in them and showed that three months of endurance and resistance training does not have positive effects on adipokines and inflammatory factors, but in this study it was found that proper training and proper exercise had a very important role in increasing BMI levels (Banitalebi et al, 2016). Nezamdoost et al. (2015) in a study entitled "The effect of twelve weeks of aerobic exercise on serum levels of vaspin, fasting glucose and insulin resistance in women with type 2 diabetes" to investigate the role of aerobic exercise in serum levels of these variables And showed that aerobic exercise combined with weight loss and body fat percentage, leads to a decrease in serum vaspin level, fasting glucose, insulin resistance. Barzegari and Amouzad (2014) in a study entitled "The effect of 8-week resistance training on plasma vaspin levels and fat profile in adult men with type 2 diabetes" investigated the role of this type of exercise in vaspin secretion and fat profile modes Showed that aerobic exercise had no effect on the fat profile of obese men with type 2 diabetes but reduced blood glucose (Barzegari, 2014). Hejazi et al. (2014) in a study entitled "The effect of twelve weeks of aerobic exercise on serum levels of leptin, vaspin and some indicators of oxidative stress in obese middle-aged women" investigated the role of aerobic exercise on physiological and hormonal indicators and showed Showed that there was a significant relationship between exercise and reduction

of serum levels of vaspin and leptin and in the obese women studied, significant changes were observed (Hejazi et al., 2014). Bashiri et al. (2014) in a study entitled "The effect of acute exercise on serum levels of vaspin and its relationship with gender in overweight elderly men" examined the extent of changes in adipocytococcus vaspin in different physical conditions in older men and concluded that There was no significant relationship between vaspin concentration and time.In addition, the study concluded that insulin and blood glucose concentrations decreased after exercise and insulin resistance increased significantly. In general, it was concluded from this study that vaspin changes in older men have little significant relationship with the amount and intensity of exercise; In addition, there is no significant relationship with vaspin and insulin resistance (Bashiri et al, 2014).

RESEARCH METHODS

The present study was a quasi-experimental study that was conducted in a combined "field and laboratory" method. The subjects studied in the study included two groups of exercise and control. Blood samples were collected as well as body mass index (BMI) before and after exercise according to standard protocols.

During the implementation stages of this study, first 20 volunteers were selected as eligible subjects based on a health questionnaire and the opinion of a specialist physician was selected and in a face-to-face meeting, complete information about the research objectives, results and benefits of doing this The research, duration and method of exercises, introduction of the relevant instructor, time and place of exercises, time and conditions of pre-test and post-test were provided to them. Also, the volunteers were randomly divided into experimental and control groups (control) and the measurement of the subjects' underlying variables, including: age), year (height), cm (weight), was also performed and recorded in special registration forms.

Research location: After determining and selecting the volunteers into two groups of training and control, the necessary coordination was done for training in the gym and the subjects in the training group participated in an aerobic training program in the gym for 12 weeks. All was held in Arsalan Sports Club in Tabriz. The subjects in the control group did not have any exercise during the study period, but in terms of nutrition and daily activities, they were in almost the same condition as the experimental group.

Training process and conditions and training program: The work process, like other aerobic exercises, included warm-up, stretching and running exercises on a treadmill, and then cooling and recovery, and the warm-up time was based on water temperature. At the beginning of training, during training heart rate started at 50% of the estimated maximum heart rate and increased to 65% of maximal heart rate by the end of 12 weeks. Thus, the subjects performed in the heart rate range of 120-100 beats per minute, equal to the average of 50 to 65% of the maximum estimated heart rate. The duration of the exercise program in each session was 60 minutes and 3 sessions per week. To control the intensity of the exercises, the heart rate was monitored 3 times per session, before and after the aerobic interval exercises on the treadmill and during cooling, to ensure a return to the initial state. Exercise samples did aerobics for 12 weeks in three sessions a week.

The estimated maximal heart rate estimation equation for exercise intensity is:

Estimated maximum heart rate = age - 220 heart rate

Activity intensity: 50 to 65% of the estimated maximum heart rate

Selected aerobic exercise program:

1 Warming up: Warm up the neck and body for 10 minutes in the form of jumping and jumping exercises

2 Running soft for 10 minutes with an intensity of 50% MHR

3 Central stability exercises for the abdomen, back and Pilates for 10 minutes,

Which includes the following exercises:

Pelvic tilt: While lying on your back, tighten the muscles of the lower abdomen so that the pelvis moves forward or the back is flat on the floor.

Crunch movement: While lying on their backs, they crossed their arms and inserted their chins. Tighten the abdominal muscles and bend upwards until the edges of the shoulders are off the ground.

Bridge movement: While lying on your back, raise your pelvis without bending your back, in which case your knees and shoulders should be in the same direction (5 repetitions).

Four-legged movement: While standing on all fours, raise one opposite arm and leg and then lower them. Repeat this movement with the other hand and foot. In this movement, the pelvis should be kept in a normal position without rotation.

Flat abdomen: They are placed behind the knees, the abdomen is folded inwards, then downwards (in a circle) to move to the ground, raising the head and shoulders slowly, the lower back should still be on the ground. They breathed slowly up and down on both sides, breathing for 5 seconds and then exhaling for 5 seconds until their hands rose and fell 5 times. Then get up again and repeat the movement (5 times)

Flat stomach: Rolling up one stretched his legs in front of him, put his hands on his legs and bent his head slightly and placed between his hands. They leaned back and bent their knees and stopped in the middle of the road. They extended their arms straight up and held their abdomen firmly. They exhaled and lowered their hands (as many as 5 times) as they returned to the top.

Above the waist: The letter T: they lay with their faces to the ground and their legs together. They raised their heads and chest slightly and spread their arms perpendicular to their bodies. The palms were down. Exhale and hold your hand back as you raise your chin and chest. The abdomen was not pulled off the ground, and the muscles of the upper back were used to keep the arms close to the body. Then return to the first state (5 times)

4: Aerobic interval (running on a treadmill for 20 minutes):

- Soft running at speed 4 and incline 1 for 4 minutes
- Fast walking at a speed of 6 without slope for 3 minutes
- Run at a speed of 8 without slope for 1 minute
  Walk softly at a speed of 6 without slope for 3 minutes
- Run at speed 8 for 5 minutes
- 2 minutes walking at speed 6 and then at speed 4 for 2 minutes

5: **Cooling the body for 10 minutes:** in the form of walking and stretching movements. It is worth mentioning that the exercises started in the first week with an intensity of 50% with 5 repetitions and at the end of the twelfth week ended with an intensity of 65% and an increase in repetition.

Nutrition status: Necessary data on food intake were obtained using a 24-hour food recall to determine the average nutrient intake, with all individuals being asked to include all foods and beverages consumed in the past 24 hours. Household utensils were used to help people remember more accurately the amounts of food eaten. The questionnaire was used for each subject in 12 consecutive times (once a week for 12 weeks). The mentioned quantities of foods were converted to grams using the home scale guide, and then each food was coded according to the instructions of the computer software processing program and analyzed by a nutritionist to evaluate their energy and nutrients.

Statistical Society: The statistical population of the present study was middle-aged overweight women in Tabriz, Arsalan Club, who at least did not have any physical activity 6 months before the present study.

The statistical sample: The statistical sample of the present study included 20 overweight and premenopausal women, with an age range of 35-45 years and BMI> 25, were from the statistical population who did not use hormone therapy and according to a specialist physician and a health questionnaire, had the necessary conditions were present to participate in the study.

Sampling: Sampling was done based on the call made in sports and public centers of Tabriz and the referral of volunteers. The process was as follows:

- General health questionnaire that subjects do not have a history of chronic diseases such as hypertension, osteoporosis, heart disease, etc. and are in perfect health
- Do not have special diets or medications
- Have no history of smoking or alcohol
- Do not have a history of Sports championship and do not have any special physical activity for at least 6 months before the training protocol

Targeted sampling was performed among women aged 35-45 years with a BMI of 25% BMI who had registered for aerobic exercise for the first time and had no history of exercise. After selecting the samples by filling out a health questionnaire during Orientation and theoretical session after introducing the research and the steps of its implementation, out of 70 participants in the orientation class after referring to the doctor to ensure their health, 20 people were invited as the final selected members to conduct the research.

Data collection tools and methods: In the present study, the following tools were used to measure the variables in different stages of the research:

Wall height meter: to measure the height of the subjects (cm).

Digital scale: to measure the weight of the subjects (kg).

Digital heart rate monitor and sphygmomanometer: to measure heart rate (beats / minute (and blood pressure) millimeters of mercury (subjects.

Laboratory kits: measurement of vaspin, serum insulin, glucose resistance test

How to measure contextual variables:

Age: The age of the subjects was recorded in months based on the age of the identity card and the report of the individuals themselves. It was then converted into a year and recorded. In this way, if the months of the last year were less than 6 months, they would be removed, but if they were more than 6 months, one year would be added to the age of the subject.

Height: To measure the subjects' height, people were placed on a flat surface with their eyes facing forward and their heads completely flat. In front of it was a graduated bar with a movable bar perpendicular to it. The movable bar was adjusted on the calibrated bar so that it was located exactly above the subject's head. However, the number on the calibrated bar indicated the subject's height in centimeters

Weight: To measure weight, a seca hand scale made in Germany was used. The subjects were placed on a hand scale without shoes and with minimal clothes so that both feet were on the scales and the hands were freely on the sides.

In this position, the person stood without moving, so as to divide the body weight between both legs, and the scale hand showed the person's weight in kilograms and grams. The weight of each person was recorded with an accuracy of 0.5 kg.

Blood sampling: Blood sampling was performed after 12-14 hours of fasting in two stages, ie before the start of training and during the twelfth week of training. To perform blood sampling, the subjects were asked not to do any exercise for two days before the test. Temperature and test hours It was recorded to maintain this condition in the next stage. 5 ml of blood was taken from the vein of the left hand of each subject in a sitting position and at rest. Celsius was maintained and then blood sampling was repeated at the same time to examine changes in the recovery period 48 hours after the last session of the twelve week exercise program.

Measurement of dependent variables

Vaspine, insulin and glucose resistance levels: One of the methods used to measure various biological indicators, including adipocytokines (ELISA) is called in this method, the molecules and proteins are measured using colorimetric techniques. In this study Also to measure the concentration of vaspin and other indicators studied by ELISA method in the medical diagnostic laboratory of Tabriz Jihad University was measured.

Methods of statistical analysis: To analyze the characteristics of the subjects using descriptive statistics as a mean and standard deviation using independent t-test was performed. In inferential statistics, the normality of the data was assessed using Shapiro-Wilkes test. . Then, to determine the effect of the independent variable) 12 weeks of aerobic exercise (on vaspin, insulin and glucose indices during the two measurement times) pre-test and post-test (first, difference data from post-test data were obtained from pre-test and using From Shapiro-Wilk test, the difference data between the two groups were compared and all statistical calculations and graphs were performed using SPSS 21 software.

RESULT

Table 1: Introduction of the test groups of the first hypothesis

	Groups	N	Mean		Std. dev.
Vaspine	Control	10	1.11	0.263	0.083
	Experimental	10	0.89	0.119	0.037

According to Table 1, it is clear that the mean level of vaspin in the experimental group is lower than the control group.

Table 2: Independent sample t-student test for vaspin test result between before and after stage

		Levene	test	For	Two	independent	groups	
		F	p	T	df	P	Mean difference	Std. dev.
Vaspine	Equal Variant	10.60	0.004	2.46	18	0.024	0.22600	0.916
	Unequal Variant			2.46	12.55	0.029	0.22600	0.916

According to Table 2, aerobic exercise has a significant relationship with the blood vaspin level of obese women aged 35 to 45 years.

Table 3: Introduction of the test groups of the second hypothesis

	Groups	N	Std. dev.	Mean dev.	Std. Err.
Glucose	Control	10	178.50	11.02	3.48
	experimental	10	162.90	13.11	4.14

According to Table 3, it is clear that the mean glucose level in the experimental group is lower than the control group.

		Levene	test	For	Two	independent	groups	
		F	p	T	df	P	Mean difference	Std. dev.
Glucose	Equal Variant	0.40	0.54	2.88	18	0.010	15.600	5.417
	Unequal Variant			2.88	72.48	0.010	15.600	5.417

According to Table 3, aerobic exercise has a significant relationship with glucose tolerance in obese women aged 35 to 45 years.

Table 4: Introduction of the test groups of the third hypothesis

	Groups	N	Std. dev.	Mean dev.	Std. Err.
Insulin	Control	10	5.27	1.44	0.45
	experimental	10	2.98	0.79	0.25

According to Table 4. It is clear that the mean insulin level in the experimental group is lower than the control group.

Table 5: Independent samples of t-student test for insulin test result between before and after stage

		Levene	test	For	Two	independent	groups	
		F	p	T	df	P	Mean difference	Std. dev.
Glucose	Equal Variant	5.79	0.027	4.40	18	0.000	2.2900	0.520
	Unequal Variant			4.40	14.02	0.001	2.2900	0.520

According to Table 5, aerobic exercise has a significant relationship with insulin sensitivity in obese women aged 35 to 45 years.

DISCUSSION AND CONCLUSION

Based on the results of this study, aerobic exercise showed a significant relationship with blood vaspin levels in overweight women aged 35 to 45 years, so that in serum vaspin control samples significantly increased in the second experiment. Is. Therefore, according to the results obtained from biochemical and hormonal tests of the study group, it can be concluded that with increasing regular and purposeful exercises in aerobic and endurance exercise, the serum level of this hormone decreases, which is in line with the results of martyrdom studies. 2016 (and Barzegari-Amouzad) 2014 (and Yuan et al.) 2008 (which showed that aerobic exercise plays an important role in reducing the expression and secretion of vaspin in the body, but these results are consistent with the results of studies by Bashiri et al. (2014) Which showed that there is no significant relationship between serum vaspin level and aerobic exercise is inconsistent.

The results showed that aerobic exercise had a significant relationship with glucose tolerance in women aged 35 to 45 years not overweight. But there is a significant relationship between glucose tolerance and regular and purposeful exercise. The more regular and precise the aerobic exercise, the lower the glucose tolerance. Therefore, aerobic and endurance exercise can play an important role in reducing the effects of diseases such as diabetes. The results of this test are consistent with the results of studies by Garcia et al. and Parsian et al., (2014). Therefore, in general, the effect of aerobic exercise on glucose tolerance can be emphasized.

The results showed that aerobic exercise had no significant relationship with insulin sensitivity in overweight women aged 35 to 45 years, but in studies of overweight people, it was found that there is a significant relationship between aerobic exercise and weight loss. There is insulin sensitivity. The results of this study are consistent with the results of the studies of Marino et al. (2014), Sheibani et al. (2012) and White et al. (2016). Therefore, the important role of aerobic exercise in reducing sensitivity can be referred to insulin.

In fact, in general, based on the results of statistical tests with 95% confidence, it is clear that aerobic exercise in obese women aged 35 to 45 years, has an effect on serum vaspin levels, insulin sensitivity and blood glucose tolerance. Also, based on Table 9 of the fourth chapter of the present study, it is clear that the average level of each test in the next stage (second stage (less than the previous stage) is the first stage of aerobic exercise, so the effect of aerobic exercise is decreasing. In the descriptive statistics section of this chapter, the issue of declining impact was mentioned.

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