

**The effect of aerobic and anaerobic exercises on leptin, estrogen and progesterone levels in non-athletic middle-aged men**<sup>1</sup>Ali Najafi, <sup>2</sup>Mahmood Najafian, <sup>1</sup>Mohammad Hasan Solhjoo<sup>1</sup>Department of Physical Education, Jahrom Branch, Islamic Azad University, Jahrom, Iran.<sup>2</sup>Department of Biology, Jahrom Branch, Islamic Azad University, Jahrom, Iran.

Ali Najafi, Mahmood Najafian, Mohammad Hasan Solhjoo; The effect of aerobic and anaerobic exercises on leptin, estrogen and progesterone levels in non-athletic middle-aged men

**ABSTRACT**

One of the achievements of science and technology, the life style is changed to machine life style, this life style associated with a sedentary. Sedentary overweight and obese, which is followed by a factor threatening human health and cause diseases including cardiovascular diseases. In this study, eight weeks of aerobic and anaerobic exercise in men and  $35 \pm 5$  years of leptin, estrogen, progesterone, subcutaneous fat, glucose, insulin and body weight have been investigated. In this study of 125 middle-aged men, a target of 30 male volunteers were selected. For the matched group, to participate in training about health, general health status, weight, activity level and amount of daily calories from your questionnaire to assess health status, participation in training programs and a three-day dietary records was collected. After review and ensure the readiness of people in this exercise, a fasting morning blood sampling is done from them. Factors in their blood measured. With the completed questionnaire and laboratory tests, as these individuals have been matched, in three groups of 10 persons of the control group, group aerobics and anaerobic exercises were divided into groups. During the experimental period was 8 weeks. Once a week during the testing of blood glucose with a glucometer people of all groups were set up. In the fourth week of their insulin levels and the measurement was done at the end, 24-hour fasting blood sampling was done after the last training again, and like the pre-test levels of leptin, estrogen, progesterone, insulin and glucose were measured. Measurement was done for weight and fat under the skin. Finally, the observation of aerobic and anaerobic exercise than the control group were analyzed. Decreased leptin levels and weight loss is observed in both types of exercise training, but will show a greater impact aerobics. Both estrogen and progesterone increase the amount of exercise training in both the positive effects of aerobic exercise than anaerobic exercise on elevated levels of these hormones. These two types of exercise training reduced fat under the skin and the decrease in aerobic exercise than anaerobic exercise groups, respectively. In a more positive effect on aerobic exercise factors were investigated.

**Key words:** Aerobic exercise, Anaerobic exercise, Leptin, Estrogen, Progesterone.**Introduction**

While scientific advances and machine lifestyle have created facilities for the people, they can cause problems for humans. Normally the progress of science with the vibrant and human activity ratios are reversed. Today one of the most important problems in developed countries, restrictions on movement and activity. This lack of mobility problems, including overweight and obese are your risk factors and cardiovascular disease at the end. The most important factor in cardiovascular disease mortality in the world are known [1-2]. Imbalance between caloric intake and caloric intake, the main cause of overweight and obesity are known [3-4]. Since more than half of the food humans are composed of Starch and Starch Excess body fat is stored so easily as has

been suggested that reducing caloric intake, prevents the digestion of starch materials. Starch most fragile enzyme, Alpha Amelaz is the inhibition of this enzyme can be reduced caloric intake [5-7]. Among other factors that influence the distribution of body fat and overweight and obesity have leptin hormone, progesterone and estrogen [8-10]. Ob gene product leptin, a hormone with a single molecular mass of 16KD, and the role of leptin in regulating body weight by acting on the hypothalamus to reduce food intake and increase energy consumption by two mechanisms, has tried to regulate body weight [11-13]. Mainly in different tissues of leptin in fat and lower in other tissues such as stomach, skeletal muscle, breast, heart and liver are produced [14-15]. Obesity is common in people who do not have anti-obesity hormone as leptin acts. With food, increases

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in blood levels of the hormone receptors and subsequently stimulate the hypothalamic satiety center and the person with anorexia refuse to eat more food [16]. Leptin in the regulation of adipose tissue as indicators of body fat and Body Mass Index (BMI) is involved [17]. Some dietary supplements have an effect on leptin levels, for example, low concentrations of leptin and zinc levels do decrease in leptin levels are increased [18]. Leptin is involved in glucose and lipid metabolism and regulating blood pressure [19-21]. Physiological stress resulting from physical activity is one of the factors regulating leptin secretion from adipose tissue [19]. High leptin levels in the long term increase in blood pressure and heart rate can be increased [22-23]. Increase the production of these hormones and blood clots can be expedited. Increased leptin is a risk factor for developing cardiovascular disease has been introduced [24-26]. Reduction in blood leptin is effective in preventing cardiovascular disease in this context, different types of exercise and diet is effective [27]. The research has shown that leptin resistance exercise and weight loss can be reduced [28-29]. Steroid hormones in the metabolism, accumulation and distribution of adipose tissue are involved, known as estrogen receptor, progesterone receptor and androgen receptor in adipose tissue is, therefore, their actions could also be related. In the presence of steroid hormones, there is a normal distribution of body fat but with a reduction in steroid hormones that occur due to age or sex glands remove the tendency to obesity, high risk for cardiovascular disease, type II diabetes and some cancers increases [30]. Estrogen fatty acid release from adipose tissue and increases glucose uptake by peripheral tissues is inhibited. Steroid hormones (including estrogen and progesterone) operation in the fat tissue by both genetic and non genetic mechanisms do. The genetic mechanism, the hormone binds to its receptor complex steroid - receptor, regulates transcription of the genes. Leptin and lipoprotein lipase in fat tissue are two of the key proteins that control the transcription of steroid hormones are regulated [30].

In connection with the actions of leptin and steroid hormones, is one of the factors examined, the amount of fat under the skin. In a study that exercise also reduces serum leptin levels, reduces the amount of subcutaneous fat [31]. The aim of this study, eight weeks of aerobic and anaerobic effect on leptin levels, estrogen, progesterone, glucose and insulin and body weight and subcutaneous fat in middle-aged men is non-athletes.

#### *Test subjects and methods of implementation:*

The research aimed to evaluate the effect of 8-week aerobic and anaerobic exercise on leptin levels, estrogen, progesterone, glucose, insulin, body weight and fat under the skin in non-athletic middle-aged

men with pre-test research design with two experimental groups (1 and 2) and a control group was performed. Population of this study, 125 healthy men who were among those targeted 30 people were selected by the subjects, 30 male non-athletes who were  $35 \pm 5$  years of age to physically all were healthy and none of them were not taking any drug. For the matched group, to participate in training about health, public health, the amount of calories through daily activity and self-assessment questionnaire for health status, participation in training programs and a three-day diet records were collected. After review and ensure the readiness of people in this exercise, a morning fasting blood sampling, and the factors they considered in their blood measured. The completed questionnaire and laboratory tests, the subjects were matched into three groups of 10 persons were placed. Now these three groups, the following objectives were applied randomly.

Control group (C): no exercise and no changes were used merely to control levels.

Experimental group1 (Ae): a group that was under aerobic training.

Experimental group 2 (An): a group that was under anaerobic exercises.

#### *Training method:*

Training consists of 3 sessions per week for 8 weeks. Couple weeks of aerobic training on aerobic exercise group and 18 to 19 hour days a week were 18 to 19 hours. Before each training session, subjects are paid for 10 minutes to warm up and stretching exercises that include running smoothly and at the end of each training session for 5 minutes in which the body had cooled down and stretch after running.

#### *The method of aerobic exercise:*

First and second week of preparation due to lack of basic subjects, including more emphasis on endurance performance soft and light jogging and stretching and exercise intensity was 60-50% of maximum heart rate. The gradual increase of intensity of the third week, also increased during exercise. Thus the practice of running a light intensity of 50 to 60% heart rate maximum in the first 20 minutes were done, gradually increased until the eighth week, the subjects for 30 to 40 minutes with an intensity of 70 to 80 percent of maximum heart be rushed. To control the intensity of the practice range when using a running record of participants has been taken in the aerobic exercise test.

#### *Anaerobic training methods:*

They also lack training in preparation for the first and second subjects, based on low-intensity

endurance exercise (50% of maximum heart rate) and stretching exercises shuttle run (10 to 20 m), respectively. The exercise intensity was gradually increased from the third week until the eighth week of the 90-80% of maximum heart rate reached. These exercises include running training steps 30 and 40 and 60 meters, which according to age and physical condition of subjects, adequate rest between exercise frequency was considered. The training program consisted of 5 repetitions of running 30 and 40 meters and 60 meters run was repeated two times.

#### *Taking blood and measuring the factors considered:*

In the pre-test fasting from all individuals and groups in the test phase 24 hours after the last training run fasting blood was measured. DBC Construction Kit and leptin levels with Canada, estrogen and progesterone kit Demeditec made in Germany with the help of ELISA kits Diaplus and fax machines in their blood was measured by ELISA reader acetate. Fold skin method and formula for determining the fat content was used. Insulin levels three times in the beginning, middle and end of the period measured. During week one drop of blood using a glucometer device (One Touch Profile Life Scan) blood glucose was measured in all groups of people.

#### *The outward profile group:*

People, all male, mean age  $35 \pm 5$  year, mean height  $168 \pm 5$ cm, average weight  $85.5 \pm 5$  kg and had an average BMI =  $30 \pm 5$ .

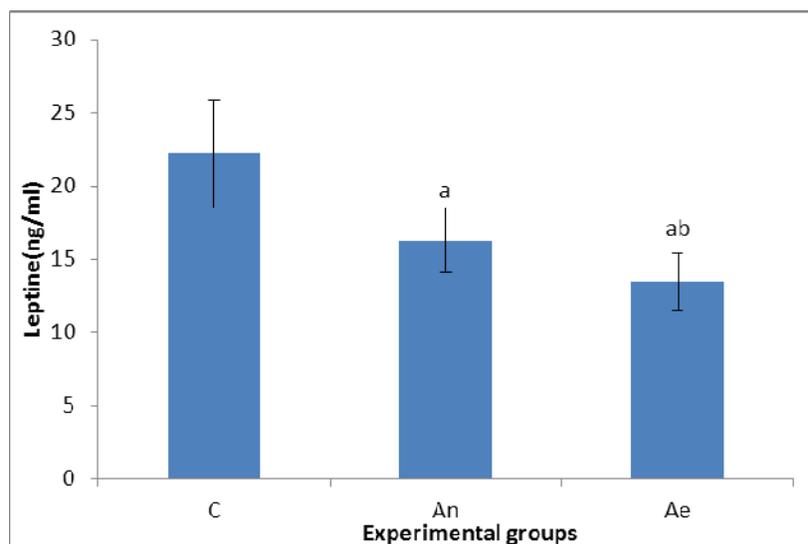
#### *Statistical analysis of results:*

To express the results, and compare values of column charts and line graphs are plotted using the Excel software. For the dispersion, Mean  $\pm$  SD values are given. For comparison between groups, one way analysis of variance (ANOVA) followed by the Turkey, s post hoc test for multiple comparisons between different groups is used. Values with  $P < 0.05$  was considered statistically significant. For all data analysis and statistical tests, SPSS software was used.

#### *Results:*

The 30 male volunteers with an optional pre-test, practice tests matched in the two experimental groups (Ae, Aerobic) and (An, Anaerobic) and a control group were placed. After 8 weeks of training, such as those in the methods section, the final test results, test collection and statistical analysis of the operations they perform and the results are as follows.

Fig.1 Serum leptin levels in the aerobic training group (Ae) and anaerobic (An) compared with the control group shows. With aerobic and anaerobic exercise, serum leptin levels decreased with the decrease in aerobic exercise, anaerobic exercise is over. Decrease in leptin levels (An) is significant compared with control group as well as reducing the amount of (Ae) group (An) and control groups was significant.



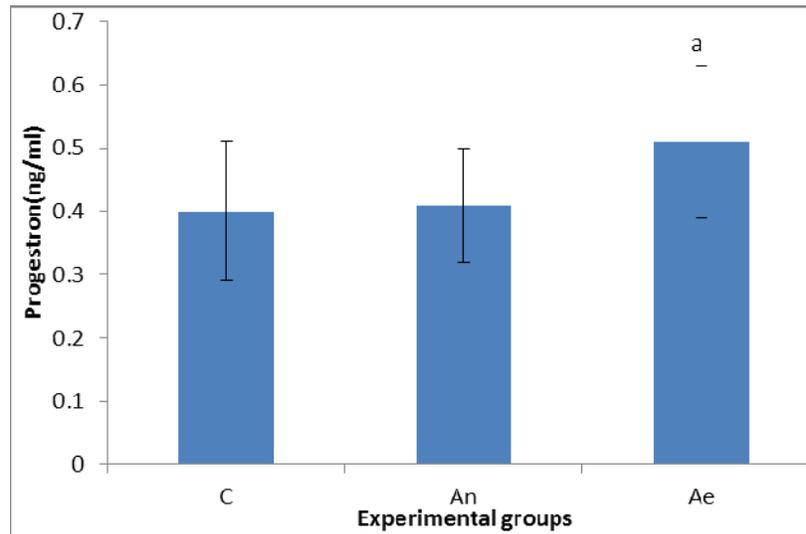
**Fig. 1:** Serum leptine levels in control group(C) and experimental groups (An and Ae).  
a: significantly different from control group (C) ( $P < 0.05$ ) b: significantly different from An ( $P < 0.05$ ).

Fig.2 Serum progesterone in the aerobic training group (Ae) and anaerobic (An) compared with the

control group shows. With aerobic and anaerobic exercise, serum progesterone levels increase with the

increase in aerobic exercise, anaerobic exercise is over. Increase in the progesterone group (An) is not significant compared to control group. Increase in the

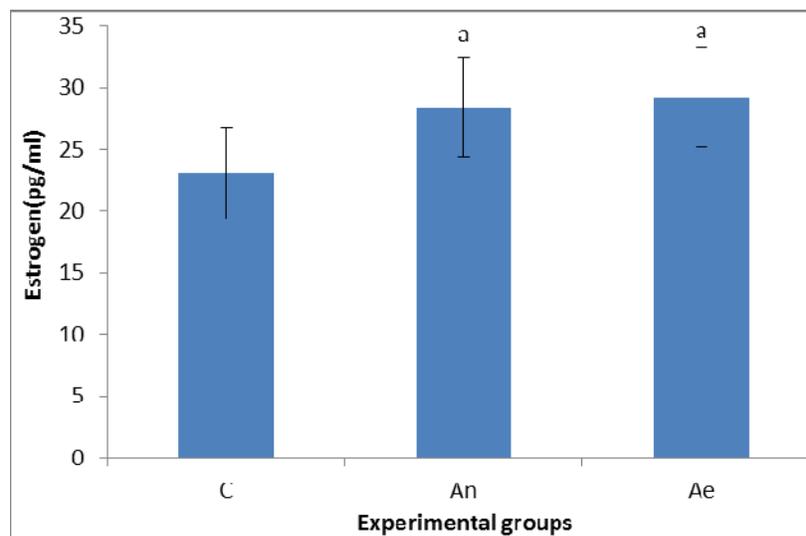
progesterone group (Ae) is significant compared to control group, but the group (An) is not significant.



**Fig. 2:** Serum progesterone levels in control group (C) and experimental groups (An and Ae). a: significantly different from control group (C) ( $P < 0.05$ )

Fig.3 Serum estrogen levels in the aerobic training group (Ae) and anaerobic (An) compared with the control group shows. With aerobic and anaerobic exercise, serum estrogen levels increase with the increase in aerobic exercise, anaerobic

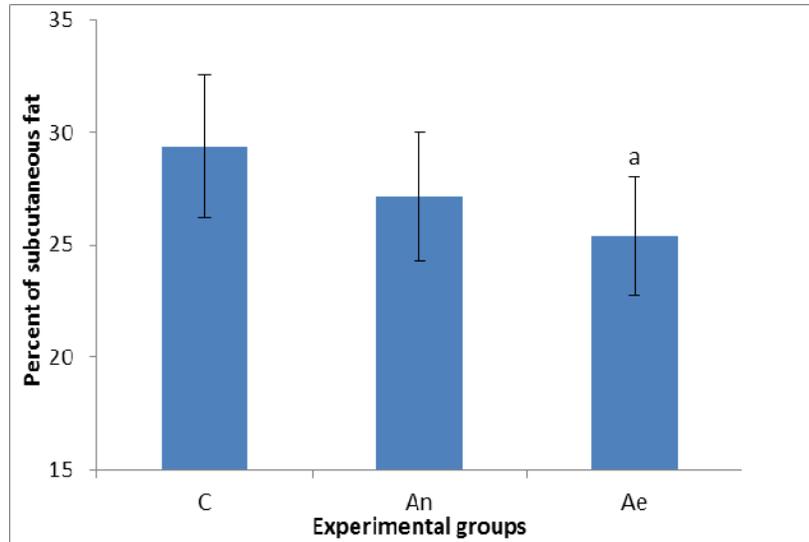
exercise is over. Increased estrogen levels in the group (An) than the control group was significant. Increased estrogen levels in the group (Ae) is significant compared to control group, but the group (An) is not significant.



**Fig. 3:** Serum estrogen levels in control group (C) and experimental groups (An and Ae). a: significantly different from control group (C) ( $P < 0.05$ )

Fig.4 Subcutaneous fat with aerobic training group (Ae) and anaerobic (An) compared with the control group shows. With aerobic and anaerobic

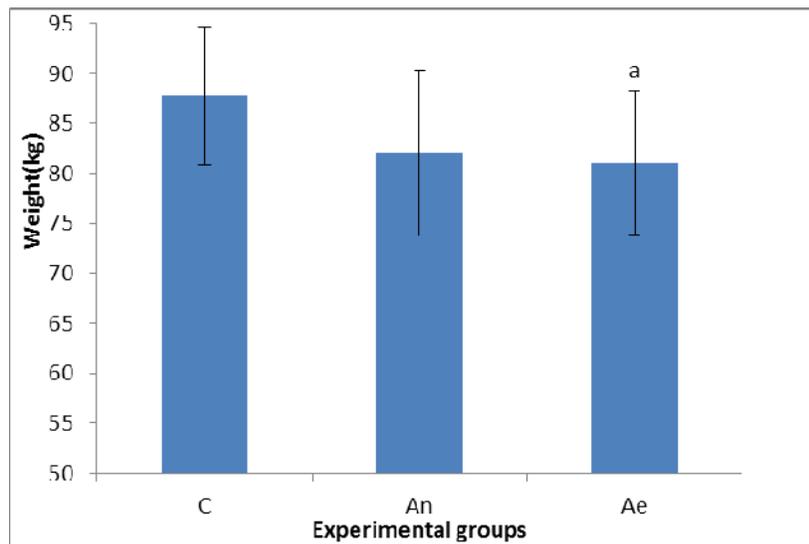
exercises, subcutaneous fat decreases. The rate of decline in aerobic exercise is more than in anaerobic exercise.



**Fig. 4:** Percent of subcutaneous fat in control group (C) and experimental groups (An and Ae). a: significantly different from control group (C) ( $P < 0.05$ )

Fig.5 Changes in weight and aerobic training groups (Ae) and anaerobic (An) compared with the control group shows. Aerobic and anaerobic exercise are reduced with weight reduction in the rate of

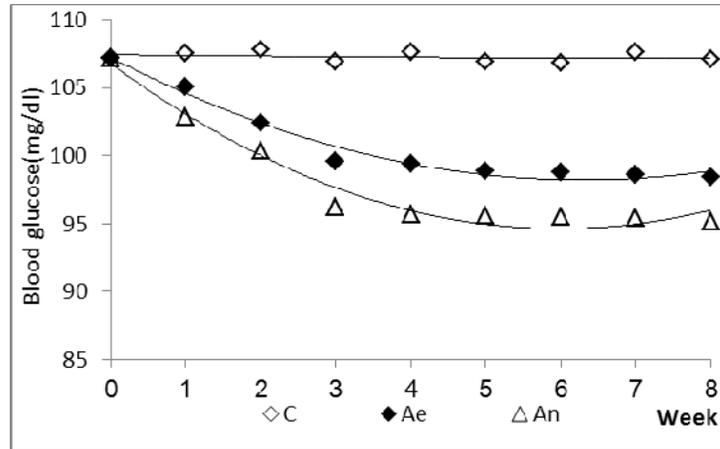
anaerobic with aerobic exercise is over. Weight loss group (An) is not significant compared with control group (Ae) than the control group was significant.



**Fig. 5:** Body weight in control group (C) and experimental groups (An and Ae). a: significantly different from control group (C) ( $P < 0.05$ )

Fig.6 blood sugar levels in the aerobic training group (Ae) and anaerobic (An) compared with the control group shows. With aerobic and anaerobic exercise blood sugar level has dropped. The reduction in group exercise is anaerobic. Blood sugar

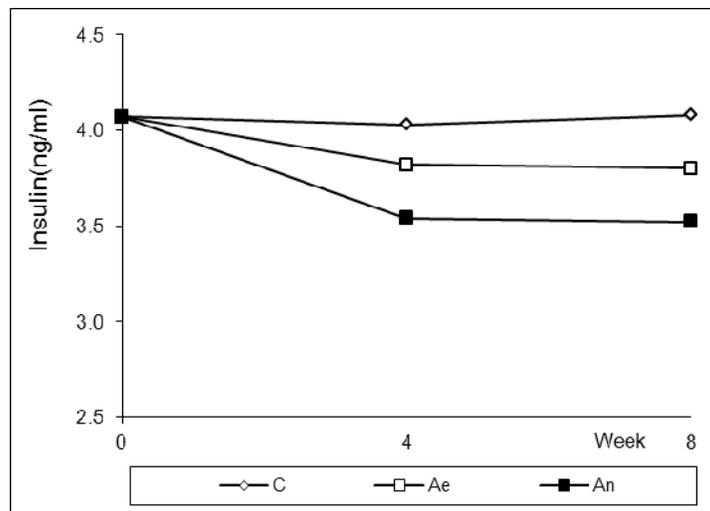
control during the test period was almost constant. The experimental groups were gradually reduced. This was reduced to about the middle of the fourth week in the wake of rapid change is not large.



**Fig. 6:** Blood glucose levels in control group(C) and experimental groups (An and Ae).

Fig.7 insulin levels in the aerobic training group (Ae) and anaerobic (An) compared with the control group shows. With aerobic and anaerobic exercise insulin is reduced. The reduction in group exercise is anaerobic. Insulin levels in the control group was

almost constant throughout the experiment. The experimental groups were gradually reduced. This was reduced to about the middle of the fourth week in the wake of rapid change is not large.



**Fig. 7:** Blood insulin levels in control group (C) and experimental groups (An and Ae).

*Conclusion:*

Comparison of past and present life in which we find in science and technology, with little mobility and physical activities that humans have faced with overweight and obesity. The sedentary and obese individuals are exposed to health-threatening factors that are most important cardiovascular diseases. Other problems caused by lack of exercise, glucose and lipid metabolism disorders and cardiovascular disease risk is followed. Several studies have shown that physical activity and exercise improves lipid metabolism and glucose in the body and reduces the risk of cardiovascular disease [32-34]. In this study, eight weeks to study the effect of aerobic and

anaerobic exercise on leptin levels, estrogen, progesterone, glucose and insulin has been studied in non-athletic middle-aged men. Experimental results matched group was used in the pretest and posttest results of aerobic and anaerobic exercise groups compared with control and has been analyzed. Leptin levels are a risk factor for developing cardiovascular disease. Reduction in blood leptin is effective in preventing cardiovascular disease in this context, different types of exercise and diet is effective in reducing leptin levels [24-27]. The study is also observed that exercise reduced serum leptin levels, but this reduction in aerobic exercise than anaerobic exercise is, after aerobics anaerobic exercise are more effective in reducing serum leptin levels.

Reduction in non-aerobic group than the control group was significantly lower in the aerobic exercise group compared with control and anaerobic exercise group was also significant. That research on exercise and leptin levels, weight loss occurs [28]. The survey results also indicate that it is exercise and weight loss is a decrease in leptin levels. This weight loss is evident in both exercise groups but in group aerobics, aerobic exercise is over the group. Reduction in the anaerobic exercise group compared to controls is not significant, but this reduction in aerobic exercise group than the control group was significant, but non-aerobic exercise group was not significant. Among the factors that regulate leptin levels, weight, fat distribution and lipid and glucose metabolism of steroid hormones are involved in the exercise of these hormones are known to be effective [30-31]. In this context, to study the effects of exercise have been changes in estrogen and progesterone. The survey results suggest that the effects of estrogen and progesterone increase the levels of exercise. The increase in aerobic exercise group than in the estrogen group is anaerobic exercise. Increase aerobic and anaerobic training group was significant compared to controls but the increase was not significant between aerobic and anaerobic exercise. Progesterone is also an exercise in both groups, progesterone levels will increase. The increase in aerobic exercise, anaerobic exercise group had increased more than in the control group was not significant compared to aerobic exercise aerobic exercise group but not significant compared to the control group compared to anaerobic training is not significant. Following the hormones estrogen and progesterone levels and decreased leptin levels, percentage of subcutaneous fat were also examined. With exercise training in both groups, subcutaneous fat was reduced, but this reduction in aerobic than anaerobic exercise groups, respectively. This reduction in the anaerobic exercise group compared to controls was not significant, but aerobic exercise group compared to controls was significant. Reports that come in sporting activities, which increase insulin sensitivity and glucose regulatory factors have a positive effect [35-36]. The report states that physical activity increases the BMR, improves blood circulation throughout the body and increasing insulin sensitivity, reduces the complications of diabetes [37-39]. In Figures 6 and 7 are shown, with exercise, blood sugar and insulin is reduced and this reduction in the group with anaerobic training is perhaps the most sought fact happened is that anaerobic training supply sugars are the main fuel. Another factor in reducing glucose and insulin could be involved, increased levels of estrogen and progesterone that has happened in this experiment [19-21]. The observations in this study occurred, one can conclude that overall, including both aerobic and anaerobic exercise training in improving aerobic

factors, but were useful in improving factors, had a greater impact.

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