Effect of Eight Week Resistance Training on Serum in Active’s Women

Shadnaz Noury

General Senior of Tehran Center PNU, Tehran, Iran

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**Key words:**
myostatin, non-athlete women, resistance exercise.

**ABSTRACT**

The present study aims to investigate the effects of an eight weeks resistance exercise program on the Myostatin serum levels of the non-athlete women who are overweight. To this end, 20 non-athlete females, having no previous illness, were selected with their Body Mass Index (BMI) (22/2 + 28/97 kg/m2) and their age range (2/02 + 33/08). The participants were randomly divided into two groups: a control group (n=10) and an experimental group (n=10). The resistance exercise was scheduled as three repeated sets of 8-10, with 50-90% RM, three days a week for a period of eight weeks. Blood samples were taken from all participants, both before starting an exercise program and two days after the last training session. Using special measurement instruments, the researcher gauged the preliminary data such as weight, height, body fat percentage, and maximal aerobic capability for all samples. After 8 weeks of the resistance exercise, the weight and body mass indicators of the experimental group were significantly diminished (p<0.05). The body fat percentage, however, did not experience any substantial change in response to treatment (p>0.05). At the same time, Myostatin serum levels and VO2MAX did increase, as a result of the resistance exercise.

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**INTRODUCTION**

The significance of the skeletal muscle, as a crucial element for public health, is well accepted among people. The skeletal muscle runs various functions including body status preservation, body motion, and meeting the metabolic needs. More specifically, skeletal muscle encompasses up to 50 percentage of the overall human weight. Playing the main role in glucose metabolism, the skeletal muscle will determine the amount of basal metabolism. For many athletes, and more specifically, in various circumstances such as senility (Sarcopenia), or diseases associated with muscle atrophy (e.g. AIDS, cancer, and diabetes), maintaining or even increasing the skeletal muscle mass is of most important[22]. A single skeletal muscle is composed of thousands of cylindrical muscle cells, namely, fibers. The muscle fibers are slender, multi-nucleus, and arranged in a parallel way so that the force of contraction is produced along the longitudinal axis of these fibers[7].

One of the unique features of the mature skeletal muscle is its innate ability to adopt to a wide range of physiological stimuli such as various practice patterns. Imposing strain on the skeletal muscle, for instance, is done through various exercises including weight lifting, which have a substantial effect on both muscle mass and strength[24]. The organs of Transforming Growth Factor β(TGF-β) are the most important Cytokines regulating the skeletal muscle growth. Myostatin, as a member of this family, plays a significant role in checking the muscle mass, and as most studies have revealed, it has played a negative regulatory role in skeletal muscle growth[27,9]. Myostatin is a member of the TGF-β family that negatively adjusts the growth of the skeletal muscle. Once it has been expressed in the skeletal muscle, Myostatin will be released into the blood circulation, and, by binding to the Activin II receptors on the muscular surface, results in an increase on P21 (cell cycle inhibitor), inhibition of the Myogenic regulatory factors such as myogen, and at last, a deduction of proliferation and differentiation of Satellite cells. Consequently, the main objective of the messaging of Myostatin is to prohibit the reproduction and differentiation of the Satellite cells, and as a result of which to inhibit the growth of muscle [10]. It is believed that the inhibition of Myostatin would result in an increase in the muscular mass and strength[23], and that immobility is related to the increased Myostatin expression and muscle atrophy[18]. It seems that the resistance exercise give rise to the reduction of Myostatin expression. Researchers have found out that the presence of this protein would have an impact on the hormone, which
controls the reproduction of stronger and more flexible tendons, and lead to the resistance weakness and elasticity of tendons. In a research conducted by Root, et al, it was claimed that Myostatin might also play an important role in adjusting the skeletal muscle with sports. They perceived a fact that a nine weeks resistance exercise will results in 37% reduction of Myostatin’s mRNA in the human subjects [21]. A year later, waker, et al also revealed that the exercise in a 10 weeks period would give rise to the Myostatin diminution [26]. In the same vein, vilagbi, et al concluded that Myostatin’s mRNA and protein expression would experience an increase in consequence of the 12 weeks resistance exercise [28]. Resistance exercise, known as the exercise pertaining to power or weight, is one of the most important exercises amongst both athletes and non-athletes people that helps them gain their physical preparation [1]. Such terms as power, weight, and resistance exercise are employed in order to describe a sort of exercise in which body muscles are required, or try, to move against a counter force, which is usually accomplished via various sports equipments. Those who take part in the resistance exercise programs expect to obtain such advantages as power increase, muscle size enlargement, improvement of operation, volume enlargement, and fat free corpulence reduction [1]. The first scientific research on the resistance exercise was conducted by Delworm and Atkins at [8]. Since then, a vast proportion of the literature on sports sciences has been devoted to the studies conducted on the desirable methods of resistance exercise for increasing power, endurance capacity, and muscular hypertrophy. The reason behind this rely on the fact that, in addition to an increase in the power, endurance capacity, and muscular hypertrophy, the resistance exercises also bring about an increase in balance, coordination, motion function, ability to do daily activities, bone mineral density, basal metabolism, self confidence, and welfare, as well as the body fat reduction [8]. Accordingly, the main purpose of the present study would be to investigate the effects of an eight weeks resistance exercise program on the Myostatin serum levels and body shapes of non-athlete women who are overweight.

Methodology:

The present study is a quasi-experimental research with a control group, which make use of a pretest and a posttest. The population of this study included all the women who referred to the sports clubs of the district 10, Tehran, Iran. From this population, 20 women, whose body mass index was over 25, were ultimately selected and divided into two groups: a control group (n=10) and an experimental group (n=10). During the research, the control group did not participate in any exercise program. The research data has alternatively been collected before and after the treatment. In order to make sure that both groups are homogeneous, using relevant methods, such data as height, weight, body fat percentage, body mass index, and VO2max were measured from all participants before their being divided into groups.

Exercise protocol:

10 day before the research begins, the participants were required to take part in an orientation session. They were explained about some safety comments on how to exercise using weights and the proper way of doing movement exercises, and then, performed a few repetition of sub maximum for each act. Afterward, the amount of maximal weight a participant could do in a two-hand snatch was gauged using the Brazilian method [3].

The resistance exercise program, including a three repeated sets of 10 with 50-90% 1RM, a 30 seconds break between repetitions and 3 minutes break between two sets, was accomplished 3 sessions a week. it is important to note that in order to respect the principle of overloading, the participants’ 1RM was after two weeks and then the next exercise program was applied based on a new 1RM [1].

The resistance exercises included:
1. Arm exercise using a barbell in a standing position
2. Bench press on a flat bench
3. Shoulder exercise using barbell
4. Hack squat
5. Leg curl

Anthropometric measure:

Height (centimeter) and weight (kg) were measured as 2(meter) height/ (kg) weight in order to calculate body mass index(BMI). For the body fat percentage to be determined, a caliber machine was used and a three point procedure employed: back of arm, the iliac, and hack squat of thigh.

Blood Analysis:

The participants’ blood samples were taken in two phase: a day before the first exercise session (pretest), and after the last exercise session (posttest). Before bleeding the participants in each phase, they took some rest in sitting position, and then, 10 cc of their blood were taken from their cubital vein. Finally, after bleeding, the samples were put in the room temperature about 10 minutes in order for them to become clotted, and then, tubes containing the blood samples were circulated with the speed of 3000-3500 centrifuge about 10 minutes.
done that, the isolated serum was kept in the temperature of -20 in four separate micro tubes. An ELISA kit was used in order to measure the serum Myostatin.

Data Analysis:

Once the normal distribution of data, using Kolmogorov – Smirnove test, has been confirmed, a paired and independent t-test was used so as to compare the results of both pretest and posttest, and also to determine the effects of treatment on the target variables as well as comparing the mean variance of the dependant variables of the given groups. Data are presented as mean ± SD (Standard Deviation). All the statistical analysis of the research have been done using a SPSS software, and the significant levels of tests were considered as p ≤ 0.05.

Results and Findings:

Table 1 illustrates the individual characteristic and anthropometric of participants both before and after the treatment. As a consequence of an eight weeks resistance exercise, the participants’ BMI and weight has significantly diminished (p<0.05), whereas, the body fat percentage of samples has not experienced any change after the treatment (p>0.05). At the same time, the Myostatin level (as shown in figure 1) and the amount of VO2max of participants has significantly increased (p<0.05).

Table 1: Body style features of participants before and after the treatment.

<table>
<thead>
<tr>
<th>Measurement index</th>
<th>Control group</th>
<th>Experimental group</th>
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<tr>
<td></td>
<td>pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td></td>
<td>Experimental group</td>
<td></td>
</tr>
<tr>
<td>Height average</td>
<td>161/09±6/20</td>
<td>161/85±8/96</td>
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<tr>
<td>Weight average</td>
<td>75/69±10/83</td>
<td>76/29±10/56</td>
</tr>
<tr>
<td>BMI average (kg/m2)</td>
<td>28/97±2/82</td>
<td>29/29±2/64</td>
</tr>
<tr>
<td>Fat percentage average</td>
<td>32/74±2/79</td>
<td>33/10±1/20</td>
</tr>
<tr>
<td>VO2max average (M/L/kg.min)</td>
<td>36/09±4/34</td>
<td>36/09±3/91</td>
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Values are presented as mean ± SD (Standard Deviation)

Discussion:

The results shows that the eight weeks of resistance exercise will cause a diminution in participants’ BMI and weight, and an increase in Myostatin level and VO2max of women, while it has no effect on the body fat percentage of the participants.

In recent years, MacFrown, et al realized an inhibitor factor in muscular growth, namely, Myostatin. The role Myostatin plays in muscular mass, in various conditions such as senility and microgravity, has been clearly manifested. As a consequence, it has been posited that Myostatin might also play an important role in muscular compatibility to resistance exercises.

For the first time, Rout, et al reported that the Myostatin mRNA expression will increase as a result of 12 weeks resistance exercise [28]. These heterogeneous findings might be as a result of using different procedures in the researches. In the research conducted by Rout, et al., for instance, the time of biopsy was about 48 to 72 hours after the last session of exercise [21], whereas in the Vilogebi, et al research, the blood sample was taken 15 minutes after the resistance exercise [28]. Or in another study, Vilogebi, et al recognized that the amount of Myostatin in response to one session of resistance exercise would be high up to 24 hours. Therefore, in the present study the best time for taking blood samples was determined in 48 hours after the last session of the resistance exercise.

In line with the researches conducted by Vilogebi, et al and nickol, et al, the present study revealed that the Myostatin level will increase in response to the resistance exercise. There are many reasons behind its being dissimilar to some other studies carried out on this topic. For example, the type of exercise protocol, exercise duration, participants’ genres and characterstics, and geographic areas are some, but not all, of the factors that may contribute to its being dissimilar to other studies.

For example:

It seems that the type of exercise would have an effect on the Myostatin response. Hitel, et al have reported that a diminution of Myostatin’s mRNA is as a result of aerobic exercise, while in this study the researcher has used a resistance exercise.

The other factor contributing to the dissimilarity of the present study with other studies is the duration of exercise. In the studies conducted by Rout, et al; Waker, et al; Kim, et al; Raw, et al; Holmi, et al; Castek, et al, the exercise duration has been ranging from 9 to 12 weeks, whereas the one in this research has been 8 weeks and 3 sessions a week.

Genre and characteristic have been the other factors contributing to the dissimilarity of present study to other studies. For most researches, the participants’ genre has been determined to be men, while this study uses
women as its participants. In researches conducted by Geperson, et al and Castek, et al, the participants’ genre has been determined to be young men. Rout, et al; Kim, et al; Raw, et al; Visent, et al have used in their studies both young and old women/men. In the same vein, the target participants in researches carried out by Hittel, et al; Saremi and gharraati; Agrinut, et al; Karsten, et al; Saremi and bahrami, were composed of men who were resistant against insulin, active men, men who smoke and non-smokers, and those who were suffering from heart deseases.

**Conclusion:**

The present study’s findings reveal that an eight weeks program of resistance exercise would be sufficient in order to make change in factors of BMI, VO2max, weight, and Myostatin. In any case, more studies need to be carried out in order to realize the impact resistance exercise might have on the Myostatin serum level.

**REFERENCES**


