Compare the effect of a bout of resistance exercise with blocking blood flow and the traditional method on inflammatory markers of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) of young male bodybuilders

ABSTRACT
The purpose of this study was to compare the effect of a bout of resistance exercise with blocking blood flow and the traditional method on inflammatory markers of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) of young male bodybuilders in Behbahan. The population consisted of all bodybuilders of Behbahan city clubs in the current year. The total sample size of 20 boys who were selected from among interested and healthy male bodybuilders voluntarily and then randomly divided into two groups of 10 people by blocking blood flow and traditional method. Considering that the aim of this study was to compare the effects of a bout of resistance exercise with the blocking blood flow and traditional method on hormonal responses of C-reactive protein and ESR of young male bodybuilders, the results showed that levels of measured C-reactive protein does not affect in practicing by traditional method and practicing by blocking blood flow method. Two-way ANOVA test results showed that the amount of C-reactive protein of blood before and after training by traditional method is not different. Also the results showed that the amount of erythrocyte sedimentation rate after exercise than before exercise did not differ when the embolism method is used.

KEY WORDS: red blood cells, reactive protein, blocking blood flow, Behbahan city

INTRODUCTION
Today, cardiovascular disease is as a major cause of morbidity and mortality, especially in developing countries and each year devote nearly 40% of deaths in the world to themselves. Due to inactive lifestyles, cardiovascular disease has increased in recent decades. One of the major fatal diseases of heart is atherosclerosis. Atherosclerosis is a progressive heart disease that begins in childhood and occurs in old ages and is the main cause of death in the industrialized world (Blake et al., 2002).

Inactivity and obesity are two major factors that are associated with the risk of cardiovascular disease. It is said that for every one unit increase in body mass index, risk of cardiovascular disease is increased 8% and, in turn, for every one unit increase in physical activity, the risk of cardiovascular disease is reduced /8 (Lira et al., 2010).

Regular physical activity with moderate intensity has positive effects on the immune system, while the high-intensity physical activity may exert pressure on the immune system. C-reactive protein (CRP) as one of the acute phase proteins plays an important role in the immune system. Most studies have investigated the effects of short-term activities of the body and there is little information about the long-term effects of regular exercise (Suzuki et al., 2000).

Since increasing physical activity leads to increase energy costs, several studies have investigated the relationship between exercise activities and serum levels (CRP). Many evidences show that aerobic and resistance exercises are a very important part of exercise recommendations to reduce weight and reduce body fat (Mathieu et al., 2009).
A lot of research on the effects of strength training on physiological variables such as inflammatory markers has been done. It is evident that the strength training based on extra load imposed on the muscle increases the muscle size and strength. This issue that what kind of strength training has the greatest impact on increasing the muscle size and strength and has the least damage to the body has been impressive to trainers and bodybuilders and fitness and exercise scientists. One method of resistance training which is considered in the recent decade and has special benefits for users is the method of resistance training by blocking blood flow in the upper or lower extremities. The person who discovered this project is Kaatsu. He studied about 40 years in solitary on increasing muscle size and strength and gained valuable experience in this field. Kaatsu training method involves light resistance training on the upper or lower extremities, while the upper body is closed with a lightweight and flexible bar, which leads an appropriate pressure to the affected organ. These exercises should not be done on people who have anemia (Sundberg, 1994). Kaatsu exercises do not cause anemia in muscles but cause to accumulate more blood in muscle capillaries which are involved in the exercise. Laboratory and fundamental applied studies over the last 10 years have shown that Kaatsu exercises with little pressure that have on the muscles and joints increase muscle size and strength, but also have many benefits for people with cardiovascular and orthopedic problems (Sato, 2005).

However, strength training with its properties often causes side effects in tissues and joints of the body. New methods of fitness, compared with traditional methods claim that have more benefits and fewer harms, but sufficient information is not yet available to prove this claim and to this end, a lot of research on the factors of body and blood should be done to identify and exploit the details of this impact on the human body.

If you have swelling in a part of your body, too much protein are released at the site of inflammation that will be placed in your bloodstream. C-reactive protein and ESR tests are usually used to predict an increase in protein and also as a principle to recognize signs of inflation, increase its levels and the further development of the disease. However, more must be borne in mind that C-reactive protein and ESR tests are not specific tests. Because they cannot determine the cause of disease or disease process that has caused swelling (Brigden, 1999).

Cardiovascular diseases are the main cause of mortality and morbidity in industrialized and developing countries, according to the Ministry of Health, 38% of deaths in Iran occur due to cardiovascular diseases (Ridker, 1998, S425-428).

The reports show that cardiovascular diseases, which caused the death of many people each year that this mortality rate is approximately equal to the sum of the other causes of death such as cancer, AIDS, child mortality and accidents (Sawatzky, 2002, pp. 396-412).

Disorders of lipid profile and inflammatory markers are the most important risk factors which cause to cardiovascular diseases. C-reactive protein (CRP) is the most sensitive and the most powerful inflammatory marker and has been introduced as the predictor of cardiovascular diseases that its relation with coronary artery diseases is recognized, and is increased in response to injury, stress and disease (Nemazi, 1389, p. 176 - 169).

Some studies have reported inverse relationship between CRP and physical exercises. (Stewart, 2007, S1714-1719).

Many hypotheses are stated in the field of cardiovascular disease that we can refer to genetic and metabolic factors and environmental factors such as nutrition, lack of exercise and unhealthy life style. (Parsian, 1389, S1-10).

This study by implementing resistance training in the traditional way with 80% of maximum strength and training by the method of blocking blood flow that is done with resistance of 25% of one maximum repetition, attempts to evaluate and compare their effect on ESR and C-reactive protein levels of young bodybuilders in Behbahan city during a practice session.

The method of research:

Given that the data of this study was conducted by using experiment in the laboratory, so the research method is laboratory. The population consisted of all bodybuilders of Behbahan city clubs in the current year. The total sample size of 20 boys who were selected from among interested and healthy male bodybuilders voluntarily and then randomly divided into two groups of 10 people by blocking blood flow and traditional method. So the sampling method is targeted - random.

Considering that the aim of this study was to compare two week of resistance training with blocking blood flow and the traditional method, on hormonal responses and ... of young male bodybuilders, so by using the sports hall and field facilities, the intended training was done and blood sampling was carried out by a laboratory specialist in training site and then was transferred to the laboratory to calculate the changes in hormonal responses due to the Kaatsu training and compared with a group who performed general fitness exercises or traditional.
Research Findings:
Describe the research variables:

<table>
<thead>
<tr>
<th>Feature</th>
<th>mean</th>
<th>standard deviation</th>
<th>minimum</th>
<th>maximum</th>
<th>median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>1/56</td>
<td>0/09</td>
<td>1/68</td>
<td>1/91</td>
<td>1/75</td>
</tr>
<tr>
<td>Weight</td>
<td>90/35</td>
<td>8/78</td>
<td>65</td>
<td>108</td>
<td>89/33</td>
</tr>
<tr>
<td>Body mass</td>
<td>24/47</td>
<td>4/23</td>
<td>8/9</td>
<td>29/3</td>
<td>24/3</td>
</tr>
</tbody>
</table>

Source: Research Findings

Height is one of the most important body mass indexes which has been evaluated in various researches and is of interest to researchers. To measure the height of the subjects, the direct measurement by the researcher was used. The height of subjects described in Table 4.1. As Table 1 shows, the average height is 1/56 cm with a standard deviation of 0/09. The median in the table shows that 50% of the subjects have a height more than 1/57 cm. And 50 percent of people have a height less than 1/57 cm.

Like height, weight is one of the most important body mass indexes which has been evaluated in various researches and is of interest to researchers. To measure the weight of the subjects, the direct measurement by the researcher was used. The weight of subjects described in Table 1. As Table 1 shows, the average weight is 52/45 kg with a standard deviation of 7/32. The median in the table shows that 50% of the subjects have a weight more than 52 kg. And 50 percent of people have a weight less than 52 kg.

Body mass as well as height and weight, is one of the most important body mass indexes which has been evaluated in various researches and is of interest to researchers. And it is resulted from these two variables. To measure the mass of the subjects, the direct measurement of weight and height by the researcher was used. The results showed that the average body mass of subjects is 24/47 and its standard deviation is 4/23. The results showed that 50% of the subjects have a body mass more than 24/3 and 50 percent of people have a body mass less than it.

Inferential analysis results:
First hypothesis: a resistance training session by blocking blood flow and traditional method has the same effect on response of C-reactive protein hormone of the young male bodybuilders.

<table>
<thead>
<tr>
<th>factor</th>
<th>F</th>
<th>significant level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training method</td>
<td>0/126</td>
<td>0/725</td>
</tr>
<tr>
<td>(Steps of measurement time)</td>
<td>3/814</td>
<td>0/059</td>
</tr>
<tr>
<td>Method * Time</td>
<td>0/284</td>
<td>0/598</td>
</tr>
</tbody>
</table>

Source: research findings. **: Significant at the 99% level  *: significant at 95% level,  ns: not significant

Average c-reactive hormone:

Methods of exercise
Chart 1: Comparison of the C-reactive protein hormone levels in various methods of exercise
To study the simultaneous effect of time and method of exercise on response of C-reactive protein hormone of the young male bodybuilders, the two-way ANOVA analysis test was used. The results of this test showed that the method of exercise has no significant effect on the response of C-reactive protein hormone of young male bodybuilders (F=2.057 and p=0.160). So there is no difference in traditional method and blocking of blood in terms of the response of C-reactive protein hormone. The results showed that in the process of measuring there is no significant effect on the response of C-reactive protein hormone of young male bodybuilders (F=0.015 and p=0.904). Therefore, the response of C-reactive protein hormone will not make a difference before exercise and after exercise. Finally the results showed that the interaction of two factors (Method * Time) on the response of C-reactive protein hormone of young male bodybuilders is not significant (F=2.057 and p=0.160).

Average c-reactive hormone:

![Chart 2: Comparison of C-reactive protein hormone levels at different times](image)

Times of exercise

The second hypothesis: a resistance training session by blocking blood flow and traditional method has the same effect on response of ESR hormone of young male bodybuilder.

Table 3: Two-way ANOVA analysis results of response of ESR hormones in different ways and times of practice

<table>
<thead>
<tr>
<th>factor</th>
<th>F</th>
<th>significant level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training method</td>
<td>0.737</td>
<td>ns</td>
</tr>
<tr>
<td>Steps of measurement (time)</td>
<td>0.567</td>
<td>ns</td>
</tr>
<tr>
<td>Method * Time</td>
<td>0.44</td>
<td>0.511</td>
</tr>
</tbody>
</table>

Source: research findings. **: Significant at the 99% level  *: significant at 95% level,  ns: not significant

To study the simultaneous effect of time and method of exercise on response of ESR hormone of the young male bodybuilders, the two-way ANOVA analysis test was used. The results of this test showed that the method of exercise has no significant effect on the response of ESR hormone of young male bodybuilders (F=2.057 and p=0.160). So there is no difference in traditional method and blocking of blood in terms of the response of ESR hormone. The results showed that in the process of measuring there is no significant effect on the response of ESR hormone of young male bodybuilders (F=0.015 and p=0.904). Therefore, the response of ESR hormone will not make a difference before exercise and after exercise. Finally the results showed that the interaction of two factors (Method * Time) on the response of ESR hormone of young male bodybuilders is not significant (F=2.057 and p=0.160).
Methods of exercise
Chart 3: Comparison of the ESR hormone levels in various methods of exercise

Discussion and Conclusion:

Hypothesis 1: a resistance training session by blocking blood flow and traditional method has the same effect on response of C-reactive protein hormone of the young male bodybuilders.

The results show that a resistance training session by blocking blood flow and traditional method has no effect on response of C-reactive protein hormone of the young male bodybuilders. The C-reactive protein levels of blood before exercise and after exercise were not different. These results are opposite with the results of Shariat et al (1390) and the results of Safarzadeh et al (1391). Safarzadeh et al (1391) stated that the practice can reduce CRP levels. Exercise directly by reducing cytokine production in fatty tissue, muscle and mononuclear cells and indirectly by increasing insulin sensitivity and improving endothelial function, decreases
the CRP. However, such results did not achieve in this study that can be due to the difference in practices or differences in the statistical samples.

With regard to environmental and genetic conditions that every statistical population has and has a different status, this hypothesis was not significant. Also it seems that with more training sessions with the control group, this hypothesis become significant.

Hypothesis 2: a resistance training session by blocking blood flow and traditional method has the same effect on response of ESR hormone of young male bodybuilder.

The results show that a resistance training session by blocking blood flow and traditional method has no effect on response of ESR hormone of young male bodybuilder. And there is no difference between these two types of exercise in terms of ESR hormone. The results showed that there was no difference between the amount of ESR before exercise and after exercise. These results are opposite with the results of Kismarki et al (2008). These results also are opposite with the results of Moradi Cherati (1389).

With regard to environmental and genetic conditions that every statistical population has and has a different status, this hypothesis was not significant. Also it seems that with more training sessions with the control group, this hypothesis become significant.

Considering that the aim of this study was to compare the effects of a bout of resistance exercise with blocking blood flow and traditional method on hormonal responses of C-reactive protein and ESR of young male bodybuilders, the results showed that levels of measured C-reactive protein has no affect in exercise by traditional method and exercise by embolism method. The results of independent t-test showed that C-reactive protein of blood before and after exercise by traditional method is not different. Also the results showed that the amount of ESR after exercise than before exercise, when the embolism method is used, did not differ. But, independent t-test results showed that the ESR when the practice is traditionally used is significant between two times. And ESR and C-reactive protein of blood is not significant when we use the exercise by traditional and embolism method.

**Research proposals:**

It is recommended that these studies be done on those who do training permanently and those who do not practice

It is recommended that this research be conducted in other provinces.

It is recommended that this research be done for other exercises and sports as well.

It is recommended that in another study the nutrition of youth and its impact on practice and C-reactive protein and erythrocyte sedimentation rate be studied.

**REFERENCES**


