Comparison of the effects of resistance training on hormonal responses by blocking blood flow and the traditional method of cortisol and aldosterone young male bodybuilders

Hassan Bahrami and Syed Ehsan Amirhoseini PhD

ABSTRACT

The study compared the effects of a single bout of resistance exercise with occlusion of blood flow and the traditional method of cortisol and aldosterone responses bodybuilders was a young man in California. The population of the city HmHV bodybuilders clubs pa up this year. The results showed that cortisol levels were not measured in the traditional way and not in the exercise training does not affect blood occlusion method. Results of t-test showed a blood cortisol levels before and after exercise is similar to the traditional method. These results also show that the amount of blood LDstrvl after exercise than before exercise is not different when it comes to use of embolism.

KEY WORDS: cortisol, aldosterone, embolism, city pa

INTRODUCTION

One of the important physiological adaptations after physical activity is hormonal adjustment. Hormonal response to physical activity is subject to intensity, duration, the type of training program and the level of physical fitness of participants (Astrand et al., 2003).

The principle of specificity of training confirms the effect on the active and involved muscle fibers. The special muscle fibers are compatible with the type of activity. Mitochondrial and vascular adaptations in response to endurance training or contractile proteins adaptation in response to resistance training have been reported (Scott and Edwards, 2008). Endurance training reduces testosterone and increases cortisol (Strand et al., 2003).

During increasing sports activity levels of growth hormone, cortisol, insulin and glucan hormone in the blood are changed and also cortisol increases called free fatty acids from adipose tissue, and reduces removal of amino acids from peripheral tissues that lead to the blood amino acids, (Gaeini, 1389).

Since aldosterone is chemically derived from cortisol, not only provides fluid balance but also the amount of sodium in the body fluids, since aldosterone is a steroid hormone, so the cellular response to an increase in aldosterone is relatively slow and almost takes about 45 minutes. Therefore, except in situations where the time of exercise takes at least 2 hours, the biological effects of aldosterone mainly affect the recovery after exercise (Gaeini, 1389).

Studies which has been done on the effects of strength training on physiological variables such as hormonal responses are abundant, but the effect of these exercises on the catabolic hormones like cortisol, which is from the Group of glucocorticoid and secreted during stress and causes to break proteins into amino acids, reducing the effects of the hormone insulin, increasing the breakdown of fats and proteins to increase blood sugar and in one sentence, the mobilization of fuel of the body and increasing the consumption of energy and during high-intensity exercise increases its secretion in the human body. Obviously strength training based on additional time imposes on muscle leads to increase or decrease the secretion of endocrine hormones of the body. What
kind of strength training has the most effect on increasing catabolic hormone levels of cortisol or aldosterone which are from the mineralocorticoid group and its main task is to lock the serum sodium and water of the body, thereby adjusting the minerals sodium and potassium that their main task is the transfer of materials in the cells of the body and regulate blood pressure and also in low-acceleration exercise of approximately more than 45 minutes and during the initial recovery period or to continue training for the long term its secretion is increased and we can say it has a role against the hormone cortisol, which is secreted in the stress. Aldosterone by resetting of the materials and water of the body and reducing blood sugar to relieve the remains of stress and restore the body to the initial state plays an important role (Chitham, 2013). And finally, the role of which one of these hormones immediately after resistance exercise by blocking blood flow, or the traditional method is highlight? There are two systems in the body that helps to keep blood pressure normal: 1) sympathetic nervous system: in this system, hormones epinephrine and norepinephrine are secreted from the sympathetic nerves and contribute to create blood pressure, and 2) the renin-angiotensin-aldosterone system: In this system, first the hormone renin is secreted by the kidneys and activates an enzyme called angiotensin 2. This enzyme causes the narrowing of blood vessels. Angiotensin also causes to stimulate the release of a hormone called aldosterone from the cortex of the adrenal glands. Also, this hormone eventually leads to water and salt retention by the kidneys and may increase blood pressure. During the practice, the release of flow from the sympathetic nervous system causes constriction of blood vessels leading to the kidneys. This reduction in blood flow, in turn, stimulates the kidney in releasing enzyme renin into the blood. An increase in renin causes to produce another hormone by the kidney called angiotensin that stimulates the adrenal cortex to secrete aldosterone. Aldosterone secretion during exercise increasingly increases. So that the plasma aldosterone levels are six times the resting levels. There is a close relationship between the release of renin by stimulating Beta-adrenergic receptors and the secretion of aldosterone. During resting, the reduction of blood pressure in the afferent arteriole of the kidney stimulates the mechanism of renin-angiotensin and ultimately controls aldosterone secretion (Mc Ardle, et al., 1385). Renin secretion by the kidneys is the first stage of the renin-angiotensin-aldosterone cycle, which controls sodium-potassium balance, the body fluid volume and blood pressure. Renin is released in response to sodium depletion and loss of blood into the renal vein. It has traditionally been thought that to muscle mass increases when the overloading of at least 70% of one repetition maximum is increasingly done with maximum repetitions. Training with obstruction of blood vessels has shown that a great consistency is created in the results of these exercises, particularly to increase muscle strength and mass, with intensity much less than what had been proposed yet. The mechanism behind this adaptation is still unknown, but the general understanding believe that a sharp rise in the hormone system, particularly growth hormone plays a huge role in increasing muscle mass in the resistance training. Probably by stimulating muscle protein synthesis, which leads to the use of fast-twitch muscle fibers type, creates this greatest force that increase muscle mass in these exercises. While overload and increasing the work of endogenic system is probably not very important, as initially thought. Moreover, although it is thought that an increase in muscle mass can even be occurred through Weight training without blocking blood flow in case put into trouble the muscle. But even this increase in volume which can be created much lower than that of blocking the blood vessels, needs much more work (Loenneke et al., 2011).

Therefore, in this study, we tried to check the effect of a resistance training session by blocking blood flow which is performed with the resistance of 25% of one repetition maximum, on the hormonal responses of aldosterone and cortisol of young bodybuilders in Behbahan city and compare with bodybuilders who work in the traditional way and at 80% of maximum.

Research Methodology:

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:

Descriptive findings:

Assessment of age, height, weight, body mass of Subjects
Table 1: Describe the subjects' weight

<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>Age</td>
<td>20</td>
<td>3/24</td>
<td>17</td>
<td>27</td>
<td>20</td>
</tr>
<tr>
<td>Height</td>
<td>172/85</td>
<td>8/19</td>
<td>165</td>
<td>187</td>
<td>172</td>
</tr>
<tr>
<td>Weight</td>
<td>78/35</td>
<td>14/61</td>
<td>63</td>
<td>92</td>
<td>79</td>
</tr>
<tr>
<td>Body mass</td>
<td>26/06</td>
<td>3/30</td>
<td>19/3</td>
<td>31/5</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: research findings

Age is one of the body mass indexes which has been evaluated in various researches and is of interest to researchers. To measure the age of the subjects, the direct measurement by the researcher was used. The age of subjects described in Table 4-1. As Table 1 shows, the average age is 20 years with a standard deviation of 7/32. The median in the table shows that 50% of the subjects have a weight greater than 20 kg. And 50 percent of people have a weight less than 20 kg.

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 78/35 kg with a standard deviation of 14/61. The median in the table shows that 50% of the subjects have a weight more than 79 kg. And 50 percent of people have a weight less than 79 kg.

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 1. As Table 1 shows, the average height is 172/85 cm with a standard deviation of 8/19. The median in the table shows that 50% of the subjects have a height more than 172 cm. And 50 percent of people have a height less than 172 cm.

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. To measure the mass of the subjects, the direct measurement of weight and height by the researcher was used. The weight of subjects described in Table 1. As Table 1 shows, the average body mass of subjects is 26/06 with a standard deviation of 3/30. The median in the table shows that 50% of the subjects have a body mass more than 25 and 50 percent of people have a body mass less than 25.

Inferential analysis results:

3.2.1 - a resistance training session by blocking blood flow and traditional method has the same effect on cortisol of the young male bodybuilders.

Table 2: Two-way ANOVA analysis results of response of cortisol hormone 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>2/057 *&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0/160</td>
</tr>
<tr>
<td>Steps of measurement (time)</td>
<td>3/761 *&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0/060</td>
</tr>
<tr>
<td>Method * Time</td>
<td>0/015 *&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0/904</td>
</tr>
</tbody>
</table>

Source: research findings. *<sup>a</sup>: Significant at the 99% level, *<sup>b</sup>: significant at 95% level, ns: not significant

To study the simultaneous effect of time and method of exercise on response of Cortisol 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 Cortisol 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 Cortisol hormone. The results showed that the process of measuring has no significant effect on the response of Cortisol hormone of young male bodybuilders (F=0/015 and p=0/904). Therefore, the response of Cortisol 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 Cortisol hormone of young male bodybuilders is not significant (F=2/057 and p=0/160).

Table 3: Two-way ANOVA analysis results of response of aldosterone hormone 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>0/753 *&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0/391</td>
</tr>
<tr>
<td>Steps of measurement (time)</td>
<td>8/518 *&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0/006</td>
</tr>
<tr>
<td>Method * Time</td>
<td>0/056 *&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0/815</td>
</tr>
</tbody>
</table>

Source: research findings. *<sup>a</sup>: Significant at the 99% level, *<sup>b</sup>: significant at 95% level, ns: not significant
Cortisol hormone:

Methods of exercise:
Chart 1: Comparison of the Cortisol hormone levels in various methods of exercise

Cortisol hormone:

Times of exercise
Chart 2: Comparison of Cortisol hormone levels at different times

A bout of resistance training by blocking blood flow and traditional method has the same effect on aldosterone hormone of young male bodybuilder:

To study the simultaneous effect of time and method of exercise on response of aldosterone 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 aldosterone hormone of young male bodybuilders (F=2.753 and p=0.391). So there is no difference in traditional method and blocking of blood in terms of the response of aldosterone hormone. The results showed that the process of measuring has a significant effect on the response of aldosterone hormone of young male bodybuilders (F=8.518 and p=0.006). Therefore, the response of aldosterone hormone is different before exercise and after exercise. Finally the results showed that the interaction of two factors (Method * Time) on the response of aldosterone hormone of young male bodybuilders is not significant (F=0.056 and p=0.815).
Methods of exercise
Chart 3: Comparison of the Aldosterone hormone levels in various methods of exercise

**Table 4**: Comparison of the hormone aldosterone before and after a bout of resistance exercise

<table>
<thead>
<tr>
<th>Variable</th>
<th>(n=10) Before exercise</th>
<th>(n=10) After exercise</th>
<th>t-statistics</th>
<th>Degree of freedom</th>
<th>(p) significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Deviation of mean</td>
<td>Mean Deviation of mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aldosterone</td>
<td>34/13 59/58</td>
<td>108/97 95/85</td>
<td>2/96</td>
<td>10:37</td>
<td>0/006**</td>
</tr>
</tbody>
</table>

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

Given that the effect of the measuring steps on aldosterone is significant, the independent t-test was used. The results of this test showed that the amount of aldosterone after training is more than aldosterone before training.

**Aldosterone hormone:**

Given that the effect of the measuring steps on aldosterone is significant, the independent t-test was used. The results of this test showed that the amount of aldosterone after training is more than aldosterone before training.

**Times of exercise**
Chart 4: Comparison of the aldosterone hormone levels at different times of exercise
Discussion and Conclusion:

Hypothesis 1: a resistance training session by blocking blood flow and traditional method has the same effect on cortisol 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 cortisol hormone of the young male bodybuilders. Because cortisol levels before and after the training exercise was not different. These results are opposite with the results of Shariat et al (1390). They concluded that immediately after exercise blood cortisol increases.

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 aldosterone 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 aldosterone hormone of the young male bodybuilders. Because aldosterone levels before and after the training exercise was not different. These results are opposite with the results of Kroll et al (1995). Also these results are opposite with the results of Limuei et al (1390). Moreover these results are consistent with the results of Surati Jaberlu et al (1390). It seems that physical activity causes to increase cortisol but the amount of cortisol depends not only on doing and intensity of activity but duration of the activity and interaction, intensity, method, time and duration of the activity are important.

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 cortisol and aldosterone of young male bodybuilders, the results showed that levels of measured cortisol has no significant difference in various methods and times of exercise. But these results showed that aldosterone after training is more than it before training.

Research proposals:

It is recommended that this study be done between high school students and different levels and various ages and be compared with each other.

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.

REFERENCES

Ardle, M.c. and D.I. cache, F. And L. cache and A. Translator Khaledan, 1385. Sports physiology one, energy and nutrition. Samt publication, the sixth edition, Tehran, Iran.


Cheatham, 2013. HPHE 6710 Exercise Physiology II, Chapter 20, Section 04, Western Michigan University, Michigan state, The USA. Copyright © 2007 lippincott Williams & Wilkins.

Gaeini, Abbasali, 1389. The basic principles of exercise physiology (energy, adaptations and athletic performance)


