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INVESTIGATING CARDIOVASCULAR AND IMMUNE SYSTEM RISK FACTORS IN ZORKHANEH-PAHLAVANI AND BODYBUILDERS ATHLETE

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ABSTRACT

The purpose of this study was to investigate risk factors for cardiovascular and immune systems in zorkhaneh-pahlavani and bodybuilders athletes. The subjects of the study included 15 zorkhaneh-pahlavani athletes with an average of 654.3±26.31 years old age, 996.2±13.178 height, 844.9±93.89 weight and 674.2±31.28 BMI and 15 bodybuilders with an average of 625.6±20.31 age, 654.3±73.176 height, 106.1±53.88 weight and 103.3±32.28 BMI who voluntarily participated in this study. This was a retrospective study and subjects had experienced at least three years of professional activity. Blood samples were taken from all subjects in one step. Statistical Analysis was performed using independent t-test and the significance level was considered $P < 0.05$. The results showed that there is a significant difference in levels of systolic blood pressure ($p < 0.024$), diastolic blood pressure ($p < 0.019$), lymphocytes ($p < 0.016$) and neutrophils ($p < 0.016$) in zorkhaneh-pahlavani athletes and bodybuilders, but no significant difference was observed in C-reactive protein ($p < 0.793$). Autonomic nervous system is activated during exercise, leading to a variety of cardiovascular reactions such as increased cardiac output. In general, long-term exercise can reduce blood pressure at rest by improving physical fitness levels. On the other hand, excessive exercise pressure leads to corticosteroids release and weakened immune system followed by a leukocytosis and inflammatory reactions.

Keywords: Blood pressure, lymphocytes, neutrophils, C-reactive protein, zorkhaneh-pahlavani athletes, bodybuilder athletes

INTRODUCTION

Immune system is one of the most important functional systems of the human body which its working properly is dependent on human health. On the other hand, the sport has always been known as a way to boost the immune system. But its efficiency in

strengthening immune system of professional athletes who exercise for a long time with high intensity is not clearly understood. Research has proven that regular, moderate-intensity exercise can improve the immune system and long-term and intense exercise weakens the immune system [1-3].

Intense and exhaustive exercises that cause immune suppression lead to tissue damage, stress hormones production and changes in immune cell functions. As a result, the incidence of respiratory tract infections increases in professional athletes which can be the result of changes in neural-hormone factors such as catecholamine, growth hormone, cortisol, beta-endorphin and sex hormones, while moderate-intensity exercises strengthen the immune system [4]. It can also be stated that the tissue damage caused by immune system weakness can reduce a professional athlete performance in training sections and competitions [5].

The intensity of physical activities can affect the cardiovascular system responses to exercise and structural adaptations such as increased volume, dimensions, mass, ventricular wall thickness, end-systolic volume, ejection fraction, stroke volume and heartbeat rate reduction, and heart rate-pressure reduction (pressure to the heart index) while resting [6, 7].

C-reactive protein protein is also one of the most important and sensitive predictors of cardiovascular risk factors that its increased production in the walls of muscle arteries can be an indicator of cardiovascular risk factors [8, 9]. In addition, the C-reactive protein releases in bacterial infections, surgery, trauma, myocardial infarction and vascular lesions in intense and prolonged exercises [10]. However, we can be said that the body's responses to sports activities may depend on race, heredity, gender, physical fitness, type, intensity and duration of physical activities [11, 12].

Since there is a reverse relationship between athletes' general health, especially their immune system health, and exhaustion caused by physical activity coaches and athletes have always been trying to find a solution to maintain the health of athletes during intense exercise and sports competitions [13]. The aim of this study is to answer the question whether there is a significant difference in cardiovascular and immune system risk factors of zorkhaneh-pahlavani and bodybuilders athletes?

MATERIALS AND METHODS

In this study the method of data collection is retrospective and the study purpose is functional. The study participants included 15 zorkhaneh-pahlavani athletes with an average of 654.3 ± 26.31 years old age, 996.2 ± 13.178 height, 844.9 ± 93.89 weight

and 674.2 ± 31.28 BMI and 15 bodybuilders men with a mean with an average of 625.6 ± 20.31 years old age, 654.3 ± 73.176 height, 106.1 ± 53.88 weight and 103.3 ± 32.28 BMI and had at least three years of athletic experience.

Measurement of variables

Subjects' Height and weight were measured respectively by a stadiometer and a standard Japanese scorpion scales, in barefoot and minimal clothing condition (weight in kilograms with 0.1 kg precision; height in centimeters with 0.1 mm precision) and registered in special data sheets. BMI was calculated as is the ratio of weight in kilograms to the square of height (m). Systolic and diastolic blood pressures were measured using stethoscope in audio method after 10 to 15 minutes resting in a sitting position on a chair. Lymphocytes and neutrophils indicators were counted by KX-21, Systemx K-1000 blood analyzer.

Statistical methods

subjects' characteristics and research data were analyzed using descriptive statistics in the form of tables and graphs. After confirming normal distribution (normality) for both groups' data (Kolmogorov–Smirnov test), the mean difference was analyzed using independent t-test with 0.05 significance level. All the calculations were performed using the spss software version 18.

RESULTS

According to the study significant differences were observed in systolic blood pressure ($p=0.024$), diastolic blood pressure ($p=0.019$), lymphocytes ($p=0.016$) and neutrophils ($p=0.009$) of zorkhaneh-pahlavani and bodybuilder athletes but for C-reactive protein ($p=0.793$) this difference was not significant (**Table 1**).

Table 1: Comparison of Mean Outcome Measurements between two groups

Variable	Standard Deviation	t	p-value
Systolic blood pressure	8.93	2.28	0.024
Diastolic blood pressure	6.00	2.49	0.019
Lymphocytes	8.60	2.57	0.016
Neutrophils	8.73	2.81	0.009
C-reactive protein	0.06	0.26	0.793

DISCUSSION

According to the results, a significant difference was observed between left ventricular systolic and diastolic blood pressures in zorkhaneh-pahlavani and bodybuilders athletes. The results showed

that systolic and diastolic blood pressures were higher bodybuilders compared to zorkhaneh-pahlavani athletes group. These findings confirm the results of previous studies indicating the significant difference

between the two indexes among endurance and resistance athletes.

In general, dynamic and endurance exercises increase the average volume and diameter of ventricular muscles in addition to increasing end-diastolic left ventricular size [12]. On the other hand, power exercises do not greatly increase the left ventricular internal diameter while a further increase can be observed in the thickness of the left ventricle. This can be explained based on heart rate and blood pressure responses during weightlifting [12, 13]. This study was consistent with **Makan *et al* (2005)** and **Henriksen *et al* (2008)**. They found that the dimensions of left ventricular and atrial are significantly larger in professional athletes compared to non-athletes. In contrast to these results, **Teske *et al* (2010)** and **perseghin *et al* (2007)** by imaging the heart stated that although the relative volume of the left ventricular increases, there was not a significant relationship in systolic and diastolic blood pressures in elite athletes and non-athletes.

Different studies obtained contradictory results for leukocytosis showing that the more severe and prolonged the physical activities, the greater and more lasting the leukocytosis. With regard to the results of this study, comparisons between zorkhaneh-pahlavani and bodybuilder groups showed higher lymphocytes for bodybuilder group

while their neutrophils was lower. In addition to the intensity, duration and level of physical fitness, there are other important factors for leukocytosis including the temperature, relative humidity, calorie intake, stress and mental pressure. indicated that 55% relative humidity and 35° C heat can rapidly increase neutrophils if the lymphocytes decreases [17, 18]. **Landman *et al* (1984)** and **Redwine *et al* (2003)** and **Goebel *et al* (2000)**, know the psychological stress along with intense training as the causes of leukocytosis. The researchers also reported that the lack of proper sleep and exercise calories will weaken the immune system and increase lymphocytes and neutrophils [22]. Probably observed differences in this study can be based on temperature and humidity changes, mental stress and lack of control over athletes' nourishing due to the retrospective nature of the syudy.

The results showed that C-reactive protein in bodybuilders is lower than in zorkhaneh-pahlavani athletes. Some research suggests that exercise can increase or decrease C-reactive protein because it is dependent on exercise intensity and duration [10, 23] while other studies have not found this association [24, 25]. **Van *et al* (2000)** and **Meier-Ewent *et al* (2001)**, believe that the increase in serum CRP levels is the result of violent power exercises and eccentric non-

aerobic training, while **Claudia et al (2004)** and **Stewart et al (2007)** reported a decrease in serum C-reactive protein levels after 8 and 12 weeks of strength training respectively. Perhaps what should be considered for the changes in C-reactive protein levels resulting from sports activities is the type of activity. Possibly resulting differences in this study could also be due to the type of sport activities [30].

CONCLUSION

The results of this study suggest that exercise can have contradictory effects on the immune system. This means that moderate-intensity exercises enhance the immune response while intense and exhaustive exercise will have immune-suppressors consequences. Therefore it is recommended to athletes and coaches to prevent intense exercises to improve the immune system functions.

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