CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1043934

Available online at: http://www.iajps.com Research Article

INVESTIGATE THE EFFECT OF STRENGTH EXERCISES ON THE IMMUNE SYSTEM'S PERFORMANCE OF ATHLETES IN THE BODY BUILDING CLUBS OF NORTHERN TEHRAN, 2012

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Abstract:

Exercise is one of the important factors in the prevention, treatment and maintenance of mental and physical health. The immune system is one of the vital systems, the proper functioning of which guarantees the health of individuals. The aim of this study is to investigate the effect of strength exercises on the immune system's performance of athletes in the bodybuilding clubs of northern Tehran in 2012. The study is a randomized-clinical trial, in which 96 athletes from northern Tehran were surveyed in 2012. Demographic data and disease history was collected through a researcher-made questionnaire; for this purpose, the subjects were divided into two groups, with each group including 48 subjects; one group was made to do regular exercises one hour per day and 4 days a week in Hirbad Gym (Tehran, District 3), and the other group was asked not to do any exercise. The medical tests were performed once a week after the exercise was completed. Finally, data analysis using SPSS software version 16 were analyzed. The mean age of the subjects included in the control group was 28±7.56, and the mean age of intervention group was 26 ±6.02, with the oldest and youngest subjects being 37 and 17 years old in order. There was no significant relationship between Eosinophil, Lymphocytes, Neutrophil, IgM, WBC neither in the control nor in the intervention group (P>0.05); but, CD4, CD8, Basophil, Cortisol turned out to be significantly related in both groups (P<0.05). The results of this study showed that, in addition to increasing the function of cardiovascular, respiratory, muscular, and nervous system, heavy exercise and physical fitness training weaken the immune system, in comparison with non-athlete subjects. In addition, regular exercise may have a beneficial effect in treating people with immunodeficiency by increasing muscle strength and muscle tone, and possibly by reducing mental stress and increasing the systemic immune function.

Keywords: *Strength Exercises, Immune System's, Physical Fitness, Body Building, Tehran.*

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Please cite this article in press as Farideh Shojaee and Hamid Sadeghi Rine , ***Investigate the Effect of Strength Exercises on the Immune System's Performance of Athletes in the Body Building Clubs of Northern Tehran, 2012****, Indo Am. J. P. Sci, 2017; 4(11).*

INTRODUCTION:

Exercise is one of the essential requirements of a healthy lifestyle, because it increases the level of cardiovascular, respiratory, and other aspect of the health of people [1]. Regular exercise can even reduce the possibility of the incidence of cancer and diabetes by 60% and 70% [2]. However, it should be noted that the beneficial effects of exercise are not limited to physical inability, and those who exercise enjoy higher psychological standards and get depressed less frequently than those who don't exercise [3]. The important thing to note here is the positive effect of regularly exercising on the body's antioxidant system, which increases the oxidative power of the body; it reduces the incidence of various diseases such as obesity, cancer, diabetes, and cardiovascular and pancreatic diseases [4]. The immune system is one of the vital systems whose proper functioning is the guarantor of the health of individuals, and if it does not function properly, life expectancy will be impossible because the body is constantly exposed to the invasion of bacteria, viruses, fungi and parasites, all of which even exists under normal conditions [5]. One of the most common significant changes that occur during is Leukocytosis; the number of white blood cells in circulation may be increased by up to four times the rest time; this rate remains high even after the end of exercising activity for several hours. In general, the amount of leukocytosis seems to be in direct proportion to the duration of exercise and reciprocal fitness. The duration of the exercise may be the most important factor. In addition, leukocytosis may also be affected by factors that regulate the body's hormonal responses to exercise; the release of corticosteroids, which confirms the central role of these hormones in the distribution of immune cells following exercise is one of these factors. An increase in the number of white blood cells during and immediately after exercise is often due to an increase in the number of neutrophils and fewer lymphocytes, although the number of monocytes may also increase [6]. Most studies conducted on athletes with moderate and appropriate exercises show that the number of white blood cells during and after the exercise is normal, in comparison with non-athletes, in these people. In addition, numerous studies have shown that there are no changes in the amount of white blood cells in subjects who didn't use to do exercise or those who have done moderate exercise months ago [7]. The purpose of this study is to investigate the effect of strength exercises on the immune system's performance of athletes in the bodybuilding clubs of northern Tehran in 2012.

MATERIALS AND METHODS:

The study is a randomized-clinical trial, in which 96 athletes from northern Tehran were surveyed in 2012. Willingness to participate, familiarization with sport training, and being male were the main inclusion criteria. Demographic data and disease history was collected through a researcher-made questionnaire; for this purpose, the subjects were divided into two groups, with each group including 48 subjects; one group was made to do regular exercises one hour per day and 4 days a week in Hirbad Gym (Tehran, District 3), and the other group was asked not to do any exercise. The medical tests were performed once a week after the exercise was completed. Blood samples were taken, and sent to Javaheri Hospital Laboratory, from two groups to examine the parameters of CD4, CD8, IgM, WBC, Cortisol, Neutrophil, Basophil, Lymphocyte, Eosinophils, and the function of the immune system of the individuals, especially regarding the number of blood cells and the proportion of lymphocytes and immune system variables, were compared in both groups. The data collected were analyzed by SPSS version 18 through using descriptive-analytical statistics and chi-squared statistical test (X^2 test)[8, 9]. Moreover, $P<0.05$ was considered as the significance level.

RESULTS:

The mean age of the subjects included in the control group was 28±7.56, and the mean age of intervention group was 26 ±6.02, with the oldest and youngest subjects being 37 and 17 years old in order. The highest frequency of BMI in the control group and the athlete was in the range of 19-25 kg/m^2 (Table 1). There was no significant relationship between Eosinophil, Lymphocytes, Neutrophil, IgM, WBC neither in the control nor in the intervention group ($P>0.05$); but, CD4, CD8, Basophil, Cortisol turned out to be significantly related in both groups ($P<0.05$)(Table 1).

Table 1: Frequency of BMI in control and intervention groups.

Variable	Group	< 18	19-25	> 25
BMI (Kg/m^2)	Control	16.7 %	56.4 %	26.9 %
	Intervention	18.8 %	58.3 %	22.9 %

Table 2: Frequency of immune factors in control and intervention Groups.

Immune factors	Groups		P-value
	Control	Intervention	
CD4	38.20	33.56	< 0.05
CD8	29.76	37.29	< 0.05
Cortisol	12.88	16.61	< 0.05
IgM	1.82	1.85	> 0.05
WBC	6170	6474	> 0.05
Neutrophil	58.27 %	54.83 %	> 0.05
Lymphocytes	38.56 %	39.33 %	> 0.05
Eosinophil	3.19 %	2.95 %	> 0.05
Basophil	1.31 %	1.02 %	< 0.05

DISCUSSION:

In addition to increasing the number of calories, exercise can play an effective role in reducing the weight of the individual through reducing appetite; several factors, such as intensity, duration, and the type of exercise are effective in this regard [10]. The WBC increases in the short term after endurance training, and may remain at a high level for at least a few hours after long training. In general, although the exact amount of exercise one might get in order to remain healthy is not precisely demarcated, it is not surprising for this phenomenon to accompany some negative consequences as well [11]. Therefore, further studies in this field can be helpful. On this basis, we decided to consider the impact of exercise on the safety of the body of athletes in Tehran. The results of this study showed that exercise has a significant effect on the levels of CD4, CD8, cortisol, and basophile in athletes, compared to the control group ($P<0.05$). the results of Nieman et al study (1994) in America showed that performing heavy exercises can reduce the cellular immune function of T lymphocytes and lethal T cells [12]. There was a significant difference in regard with CD4/CD8 ratio between intervention and control groups and the athletes experienced considerable decrease in the levels of CD4 and CD8 in the present study. The results of Gleeson et al research (2007) indicated that heavy exercise can lower your immune function by more than 1.5 hours a day or more per week [13], which is consistent with the findings of the present study. The results of Lakier et al research (2003) in Africa showed that changes in the immune system's performance due to exercise-induced direct changes in the immune system are not due to hormonal changes [14]. In comparison with the control group, athletes participating in the present study experienced significant increase in their cortisol hormone. The findings of another study showed that the safety performance of those who do regular exercise is higher than those who do not exercise [15]. However, it has been claimed that decreased safety because of heavy exercise is temporary and does not have any serious effect [16]. The results of Cieslak et al (2003) study showed that there is no significant correlation between cortisol levels and physical activity and the active subjects are more likely to develop respiratory infections compared with inactive individuals [17]. The level of cortisol hormone was 16.6% in athletes and 12.8% in the control group subjects of the present study. Based on the findings of Suzuki et al research (1996), there is no change in the number of neutrophils in subjects who have had severe exercise without former training [18]. The rate of neutrophil was 58.4% and 58.2% in athletes and non-athlete subjects participating in the present study, with no significant difference in the two groups. In addition, studies have acknowledged that the number of neutrophils and lanphocytes is normal in athletes, and exercise does not change the number of these cells [19], which is, also, consistent with the results of the present study.

CONCLUSION:

The results of this study showed that, in addition to increasing the function of cardiovascular, respiratory, muscular, and nervous system, heavy exercise and physical fitness training weaken the immune system, in comparison with non-athlete subjects. In addition, regular exercise may have a beneficial effect in treating people with immunodeficiency by increasing muscle strength and muscle tone, and possibly by reducing mental stress and increasing the systemic immune function. Evaluating the effects of exercise on other factors and immune system hormones is strongly recommended.

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