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Effect of Two Months Endurance Training on Immune Cells and Humoral

Farah Nameni

Deparment of Physical Education, Branch Varamin-Pishva,
Islamic Azad University, Varamin, Iran

Abstract: Immune system have potent intracellular that regulate inflammation and immune response and exercise is the strongest stress to which the body is ever exposed.The body response to this stress through a set of physiological changes in its metabolic, hormonal and immunological systems [1]. The purpose of the study was to examine the effect of 2 months endurance training on plasma immune cells and humoral responses.Eighteen active women that were college student, participated in the study, who were normal healthy, with no positive clinical finding. After having the procedures fully explained to them written information consent. Height, weight, Vo_2 max and body fat of them measured, later they performed selected endurance training for two months. Pre and post 8 weeks exercise, venous blood samples were taken. Data was analyzed using paired sample t - test.Concentration CD_4, IgA and CD_4 / CD_8 increased and CD_8 decreased significantly. It was showed that endurance training may induces changes in lymphocyte subsets and CD_8, CD_4 function adapted in experimental group.We conclude that endurance training may result in significant alteration in T lymphocyte number, but their actual significant for immunity is seen controversially.

Key words: Immune system · Exercise · Active female

INTRODUCTION

The human body constructs different defensive layers to resist against the pathogenic factors. One of these layers is the defensive system that exists in the blood circulation which is known as the leukocytes [2]. The immune system is divided in to two general categories: the innate immunity (natural or unspecific) and the acquisitive immunity (adaptability or specific). By proliferation the number of the cells which directly involve in the intrusive factors and produce the particular defensive proteins, the acquisitive immunity resist against the pathogenic factors [3]. The immune system components are cellular or soluble which are splashed from the specific cells and have a particular operation in the particular active conditions [4, 5]. Exercise is the strongest stress to which the body is ever exposed. The body response to this stress through a set of physiological changes in its metabolic, hormonal and immunological systems.CD_4 and CD8 are often produced and splashed by macrophagic (monocytes subsets) and T cells (lymphocytes subsets) [6]. Due to the resistance of immune cells against the obtained components such as free radical, hydrogen ion and calcium changes from the pressure on the muscles, the increase, multiplication and operation of the immune cells maybe cytosolic. If the activity weakens the immune system it can cause infection and the hormonal changes. The enzymes, the metabolic needs, the changes of the energy level and glycogen, the oxidative stresses and the increase of the body central temperature are the effective factors in this field. By doing an intensive activity, the lymphocyte T subsets concentration of blood circulation solution shows a two-phase response and its symptom is the cell proliferation during and immediately after the activity and a meaningful decrease in their numbers in the recovery period [7, 8].

The production of cytokines is only one stage of multi-stage defense process that leads to an increase in the cytotoxic lymphocyte and the increase and decrease in the number of immune cells may occur contrarily [9, 10, 5]. Besides the total subsets cells in response to the activity may have a normal effect on the lymphocytes operation. Doing a 120 minute treadmill activity with a 65% V_{O2}max which was a persistent exhausting activity showed the increase. It is also stated that the light training up to 85% of aerobics threshold in a less than 2 hour period showed a lesser changes in hormonal reaction and immune cell concentration in comparison with an intensive training to 100% aerobics threshold for a 3 hour

Corresponding Author: Farah Nameni, Department of Physical Education, Branch Varamin-Pishva,
Islamic Azad University, Pishva, Iran. Tel: +09125354053.

period. The activity with the maximum amount of oxygen consumption raging from (75%, 30%, 65%) and in different time periods (120%, 60%, 30%) showed that the highest decrease [10, 11].

In another research by Kendal and the colleagues during the study of the activity and the response of blood lymphocytes subsets, the effect of participation, length of performance and physical preparation of tests were checked. Other similar result of the researches done on 11 well prepared cyclists indicate the meaningful increase of IgA, CD4, CD8 and the meaningful decrease of TNFα, CD4, CD8 and the meaningful decrease of IL2, CD4/CD8 which all show the temporary changes of immune system operation [9]. Having done a rowing activity on the ergo meter and studying the blood samples for few times shows an increase in the leukocytes, granulocyte, lymphocyte, TNFα, CD4, CD8 which in the condition of returning to primary state for a few hours all the above cases were in a higher level of resting state [5, 3]. Of course doing ergo meter in the Baj study showed a meaningful decrease of CD3, CD4 and decrease of TNFα recovery [12].

IgA immunoglobulins commonly found in airway and alveolar space secretions, may have diffused from the serum during recovery from prolonged endurance exercise nonspecifically and/or in response to microbial agents and antigens introduced into the airways during the exercise bout. Secretory immunoglobulin A (IgA), the predominant immunoglobulin in mucosal secretion, is a major effectors of resistance against pathogenic microorganisms. Hofman and the colleagues studied about immune cells and their subsets responses to the repetitive under maximum activity and before the activity and at the recovery period until 5 days later, they assessed leukocytes, IgA in persons that had a regular physical training. The increase of IgA percentage and meaningful increase of leukocytes are the results of this research.Checking the effect of two eccentric and concentric sport standard on particular indexes of female athletes immune system and changes comparison showed that the above factors in both group of athletes and non athletes (before and immediately after the activity on the tread mill) had a meaningful increase [4, 13, 3].

The effect of two types of active and passive recovery on indexes changes of immune system of male collegian athletes due to the intensive sport to exhausting indicated that doing an exhausting sport activity by male collegian athletes caused the meaningful decrease in amount of neutrophile. But after a 15 min active recovery between 65% to 75%, the heart beat increase in relation to their undergone passive recovery during the lying period some meaningful changes were not seen on the stated indexes and also having a 30 min active or passive recess caused the stated indexes almost return to the levels before the activity [3].

MATERIALS AND METHODS

Eighteen recreational active women (age: 21.6±1.7 years, height: 61.45±2.71 cm, weight: 57.25±6.99 kg, V_{o2}max: 34.18±2 ml. kg^{-1}. min^{-1}) participated in the study. The experimental protocol was approved by the ethics committee. Blood sampling were obtained before exercise into a glass tube EDTA. The tube was kept on ice for 15 min before centrifugation, then they participated in a two months incremental endurance training program. After two months, subjects blood sample were obtained. Plasma was separated from the cells and stored until subsequent analysis for CD4, CD8 and IgA.We used of the flow cytometery three color to perform cell sorting (CD4, CD8). Determination of different subsets of leukocytes was accomplished by flow cytometry with three-color analysis.The method for three-color flowcytometry analysis is based on a high degree of standardization. Cell surface molecule density is expressed as molecules of equivalent soluble fluorochrome. IgA concentration (microgram.mg protein-1) was measured by ELISA. In this research descriptive statistics such as average, standard diversion and diagram were used. Data was analyzed using paired sample t- test.

This basic and semi research by designing a pre test and post test was done on a group before and after the performance of independent variable,the department variables were measured. The statistical union of research includes the female undergraduate of physical education which had a regular collegiate sport activity during the two previous years. The statistical samples were eighteen participators which after filling up the testimonial forms and particular health questionnaires were selected and participated in research. Dependant variable was a selected endurance training. Undependant variables were some of the immune indexes are the acquisitive immune indexes of the blood circulation which have cellular structure.

RESULTS

Means showed the mean plasma concentration of CD4,IgA and CD4/CD8 increased after 8 weeks exercise, the mean plasma concentration of CD8 decreased IgA secretion rate did not change significantly after exercise (Figure 1 and 2 and Table 1).

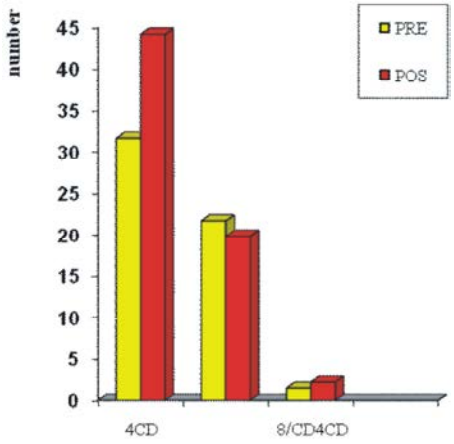

Fig. 1: Changes of CD4, CD8 and CD4/CD8

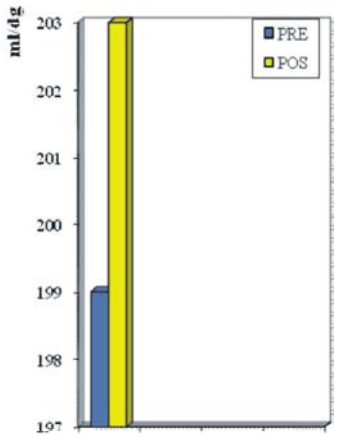

Fig. 2: Changes of IgA

Table 1:Descreptive Statistics

	Mean±Std. Deviation	
Vatiables	*pre*	*pos*
CD4	31.72±4.41	44.22±5.58
CD8	21.78±4.39	19.89±2.3
CD4/CD8	1.53 ±0.36	2.27±0.45
IgA	200.56±93.2	202.83±100.08

Table 2: The Comparison of t- test

Variables	F	P
CD4	3.71	0.01*
CD8	4.88	0.006**
CD4/CD8	2.83	0.05*
IgA	1..57	0.22

p≤ 0.05*

p≤ 0.01**

T-test showed IgA response was not significantly but CD4, CD8 and CD4/CD8 response were significantly (Table 2, P≤ 0/05 and 0.01).

DISCUSSION

The present study provides information about changes in the plasma concentration of the CD4, CD8, IgA and CD4/CD8 after 8 weeks endurance training. Recent studies show that several immune cells can be detected in plasma during and after strenuous exercise [14, 15]. In this study immune cells changed. The selected endurance training was not very strenuous and did not affect on increasing or suppressing of immune cells function or proliferation, so, endurance training induced adaptation in immune cells. Moderate endurance training may result in significant alteration and adaptation in T lymphocyte number,but don't suppress immune function. It was concluded that endurance training may induces changes in lymphocyte subsets but not in suppression of immune function after selected endurance training [16-18]. Gleason reported that among the trained and well prepared persons and champions who have over training. Pedersen declared that the long time activity almost causes the increase of lymphocytes concentration. He showed that an intensive extrovert activity to 80% of the maximum of consuming oxygen consumption [1]. Cytokines facilitate an influx of lymphocytes, neutrophils, monocytes and other cells, which participate in the clearing of antigens and healing of tissue [8, 13]. Decreased synthesis, internalization, or shedding of these surface molecules can induce a subsequent detachment of specific leukocyte subpopulations from the vascular bed in peripheral tissues and organs. So the mobilization of different leukocyte subpopulations into the circulation during strenuous exercise may at least in part be determined by the level of stress hormones and their effect on adhesion molecules expressed on leukocytes and endothelial cells [1]. This investigation has demonstrated that endurance exercise was associated with a more pronounced change in concentrations of CD4 and CD8 cells. The mechanisms behind these alterations could be neuroendocrine -induced changes in expression of adhesion molecules on both leukocytes and vascular endothelial cells, mobilization of different leukocyte subpopulations into the circulation, suppression of intracellular functions in the circulating lymphocytes, or, most likely, a combination of these factors [6, 19]. As a result, T-lymphocyte populations contained within the peripheral lymphoid compartments that are responsible for the exercise-induced increase in blood T-cell numbers [2]. Changes of IgA response was not significantly, because selected endurance training was not intensity. It has been well established that prolonged endurance

exercise is associated with muscle cell damage and local inflammation. It has been hypothesized that natural auto antibodies may be used to assist macrophages in disposal of muscle cell breakdown products. It is possible that these antibody leave the circulation to carry out this same function in tissues. It seems more researches are required.

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