Effect of Two Months Endurance Training on Immune Cells and Humoral

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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, VO2 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 CD4, IgA and CD4/CD8 increased and CD8 decreased significantly. It was showed that endurance training may induces changes in lymphocyte subsets and CD4, CD8 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 into 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. CD4 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% VO2max 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.
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 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. Secretary immunoglobulin A (IgA), the predominant immunoglobulin in mucosal secretion, is a major effectors of resistance against pathogenic microorganisms. Hofman and the colleagues studied and post test was done on a group before and after the activity variables were measured. The statistical samples were eighteen participants which after filling up the testimonial forms and antigens introduced into the airways during the exercise bout. Secretary immunoglobulin A (IgA), the predominant immunoglobulin in mucosal secretion, is a major effectors of resistance against pathogenic microorganisms. Hofman and the colleagues studied and post test was done on a group before and after the activity variables were measured. The statistical samples were eighteen participants 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).
Table 1: Descriptive Statistics

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<thead>
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<th>Variables</th>
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<tr>
<td>CD4</td>
<td>31.72±4.41</td>
<td>44.22±5.58</td>
</tr>
<tr>
<td>CD8</td>
<td>21.78±4.39</td>
<td>19.89±2.3</td>
</tr>
<tr>
<td>CD4/CD8</td>
<td>1.53 ±0.36</td>
<td>2.27±0.45</td>
</tr>
<tr>
<td>IgA</td>
<td>200.56±93.2</td>
<td>202.83±100.08</td>
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</table>

Table 2: The Comparison of t-test

<table>
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<th>Variables</th>
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<tbody>
<tr>
<td>CD4</td>
<td>3.71</td>
<td>0.01*</td>
</tr>
<tr>
<td>CD8</td>
<td>4.88</td>
<td>0.006**</td>
</tr>
<tr>
<td>CD4/CD8</td>
<td>2.83</td>
<td>0.05*</td>
</tr>
<tr>
<td>IgA</td>
<td>1.57</td>
<td>0.22</td>
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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 [1]. 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

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

Fig. 2: Changes of IgA

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).

p < 0.05*

p < 0.01**
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.

REFERENCES