Effect of Moderate Intensity Training on Changes Leukocytes Subsets in Men Football Player

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Abstract
Type, intensity and duration of exercise, determining the effect of exercise on the immune system. This study is aimed to investigate the effect of moderate intensity training on Changes of Total Leukocytes and Leukocytes subsets counts in men football player. 11 male college football player of Jahrom University who had at least six months football training, participated in this quazi-experimental study. The (means±SD) age, height, weight and BMI of subjects were as follow: (21.90 ±0.87 yr, 170 ± 0.04 cm, 64.42 ± 6.44kg and 22.05 ± 1.68 kg / m^2 ). In this study, subjects, runs for 30 min at 65% [moderate-intensity training] maximal Heart rate. Blood was drawn immediately before and after exercise. The data were analyzed using SPSS12 with dependent t-student test and statically significance was set at P ≤ 0.05. The result showed that Total Leukocytes, Lymphocytes and Monocytes counts decreased and Neutrophils and Eosinophil counts increased after moderate intensity training. And also, we demonstrated that significant decreased in Lymphocytes after moderate intensity training. These data demonstrate that a session moderate intensity training leads to Levels changes of leukocytes and subsets, but these changes not significant in total Leukocytes.

Keywords: football, leukocyte, Lymphocytes, Monocytes, Neutrophils, moderate intensity training

1. Introduction
Over the last century, people have become less active, adopting more sedentary habits. Several researchers in their studied showed that Changes in lifestyle and physical inactivity can lead to increased incidence of many chronic diseases which are major causes of death (36 million each year) and health problems in the world (wen et al., 2012; lee et al., 2012; Woodcock et al., 2011). We know that Physical activity and Exercise training is a stressful stimulus that induces changes and adaptation in many organs (e.g. skeletal system, endocrine system, pulmonary system, cardiovascular system, immune system) (zar et al., 2012). The immune system is a defence network that plays an important role in human. Many studies have supports the concept of positive and negative impacts of exercise on the immune system. These effects are highly variable, depending on the nature, frequency, duration and intensity of exercise (Senchina & Kohut, 2007; Brolinson et al., 2007). We know that intense training can effected on athlete’s body system such as
variety of cellular, humoral, innate immunity and amount of cytokines (Tofighee et al., 2014). Recently, studies investigated the relation between physical stress and the immune system. In this context, researchers have examined the effects of exercise on immune function (Nieman, 2000). Some of studies shown that regular activity and moderate intensity training, have beneficial role in prevention of many disease (Malm, 2004; Kraus et al., 2002; Izdebska et al., 2004; Warren et al., 2005). Varieties of published data suggest that immune system function changed after physical activity. Immune system divided into subset, the innate immune and the adaptive immune. Elements of the innate system include exterior defences (such as the skin and mucous membranes), nonspecific phagocytic leukocytes, and serum proteins. Malaguarnera et al. (2008), demonstrating that, different component of immune system activated against pathogens and also act as the first defence. According to various studies, we can say that Research on the effects of exercise on immune system encompasses a wide range of sporting activities including short-term, exhaustive activity, endurance and long-term activities, and regular light exercise (Tofighee et al., 2014). According to the American College of Sports Medicine (ACSM), aerobic activities ranging from 40 to 59% of VO2max, 55 to 69% of maximal heart rate are considered moderate intensity (Haskell et al., 2007). Several studies showed that Intense and vigorous training induces increase in Numbers of Circulating Leukocytes subsets such as lymphocytes, monocytes, and neutrophils (Nielsen, 2003; Shephard, 2003). Buttner et al. (2007) has suggested that intense training induce decrease in immune system components. Whereas this components increase after moderate exercise. Therefore, this study aimed to explore the releasing points and interactions between moderate intensity and leukocyte subsets changes.

2. Materials and methods

11 well-trained male college football player between 20 and 22 year participated in this study, which had at least six months football training. All participants were informed about the purpose and risks of the study before written, informed consent was obtained. Subjects’ history of heart disease - cardiovascular, hypertension, diabetes, smoking or using drugs not specified. During the study, subjects were asked not to participate in any activities other than training. Demographic data of all subjects summarizes in table 1.

<p>| Table 1. Demographic data of all subjects |</p>
<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
<th>BMI (kg/m²)</th>
</tr>
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<tbody>
<tr>
<td>21.50 ± 0.87</td>
<td>176 ± 0.04</td>
<td>64.42 ± 6.44</td>
<td>22.05 ± 1.68</td>
</tr>
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Values are Means ± SE, n = 11 subjects; BMI = body mass index.

The Karvonen Formula is a method that uses your age and fitness level to determine your target heart rate training zones. Developed by Dr. M Karvonen, the Karvonen Formula offers a more personalized number than the standard equation and is considered the most accurate means of determining heart rate.

\[
\text{HR target} = \% \text{ Intensity} (\text{HR max} - \text{HR rest}) + \text{HR rest}
\]

The resting heart rate is calculated by measuring your heart rate before getting out of bed in the morning, each day, for 3 days. Add the 3 resting heart rates together and divide that sum by 3 so that you have your average resting heart rate. (As fitness improves the resting heart rate usually goes down). The maximum heart rate can be determined by subtracting your age from 220.
Once Maximal Heart Rate was determined, the athletes completed on 60-min exercise trials at 65% [moderate-intensity exercise] maximal Heart rate (table 2).

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Time</th>
<th>Load</th>
<th>Type of exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate-intensity</td>
<td>60</td>
<td>65% Maximal HR</td>
<td>Running outdoors</td>
</tr>
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During training, maximal Heart rate was measured, as described above, was measured every 5 min throughout trial to ensure that each athlete was exercising at the correct relative intensity. Trial was conducted between 7:00 AM and 9:00 AM.

A 6-ml blood sample was drawn from a forearm vein by venipuncture immediately pre- (Pre) and post-exercise (Post) of training.

Statistical significance was set at P < 0.05. Data are expressed as means ± SD. The changes from pre-exercise to post-exercise were compared using Student’s paired t-tests. Statistical analysis was performed using SPSS version 21.0 for Windows.

3. Results

In order to observe the changes of immune system parameter after moderate intensity exercise, total leukocyte, Lymphocytes, Monocytes, Neutrophils, Eosinophil and Basophil were analyzed from the blood collected at before and after moderate intensity exercise. We show changes in pre-exercise and immediately after exercise (moderate intensity) values of Total leukocyte, Lymphocytes, Monocytes, Neutrophils, Eosinophil and Basophil counts in table 3.

Total leukocyte count was lower than pre-exercise values immediately after moderate-intensity exercise (p = 0.073) (Fig. 1). Neutrophil count was higher than pre-exercise values immediately after moderate-intensity exercise (p = 0.545) (Fig. 1). And also, Lymphocytes count was decreased immediately after moderate-intensity exercise. Whereas, this decrease was significantly lower than pre-exercise values (p = 0.001) (Fig. 1).

In addition to, Eosinophil count increased after moderate intensity exercise (p = 0.754)(Fig.2).

Monocyte count was decreased immediately after moderate intensity exercise (p = 0.877). In addition to, Eosinophil count increased after moderate intensity exercise (p = 0.754)(Fig.2).
4. Discussion

In this study we observed the changes in the immune system parameters in relationship with Intensity of exercise. 12 male college football player completed the exercise programs with blood samplings at 2 different checkpoints of pre and after moderate intensity exercise. The primary finding of the present study was that immune cells number such as lymphocyte, Monocytes, Neutrophils, Eosinophil and Basophil counts changed in the circulating blood after 30 min running. Total Leukocytes, Lymphocytes and Monocytes counts decreased immediately after moderate-intensity exercise. Whereas, decrease was significantly lower than pre-exercise values in Lymphocytes count ($p = 0.001$). On the other hand, Neutrophil and Eosinophil count was increased after moderate intensity exercise (Fig. 1 & 2). When a comparison was made between these changes and the ones in other studies carried out on Leukocytes, both similarities and differences were observed (Friedrich, 2008; Wigernaes et al., 2001; Yamamoto et al., 2008; Ibrahim, 2013; Khoshkhaheh et al. 2012; Haemi Jee and Youngsoo, 2012).

In our previous study, we demonstrated that immune system cell effected of intensity of training in male college judoists. In this study, subjects, runs on a treadmill for 60 min at 45% [low-intensity exercise] in first week and 60% [moderate-intensity exercise] in second week and third week run with 75% [high -intensity exercise] maximal Heart rate. The result showed that Total Leukocytes, Lymphocytes and Monocytes counts decreased and Neutrophils counts increased after low intensity exercise. In addition to, Total Leukocytes and Neutrophils counts increased and Lymphocytes and Monocytes counts decreased after moderate-intensity exercise. Whereas all of these parameters increased after high -intensity exercise (zar et al., 2014).

In other study, we examine the Effect of 8 weeks endurance training on immune system cell changes with recovery period. In this study, subjects, runs on a treadmill for 15-30 min at 50% - 70% maximal Heart rate for 8 weeks, with Venous blood sample was taken at pre, post and at 24- hours and 48-hours after exercise we found that lymphocyte level increased after 4th week and 48h-recovery, but decreased after 8th week (Mid-exercise), and 24h- recovery in exercise group. Also levels of Neutrophils and Monocytes decreased after 4th week (Mid-exercise), post- exercise (8th week), 24h- recovery and 48h-recoveries in exercise group (zar et al., 2012). Ibrahim (2013) in his research showed that, WBC and Neutrophil count significant increased after exercise (70 minutes and intensity of exercises is about 85%) And also Lymphocyte count significant decreased only after exercise in the evening (Ibrahim, 2013). Result of study showd that Circulating total lymphocyte counts decreased significantly 30 min after exercise, and Total leukocyte counts, Monocytes and Neutrophils were increased significantly 30 min after exercise (Abbasi et al., 2013).

It also seems the type and intensity of exercise with the effect on plasma catecholamines and cortisol, effect on the number and function of peripheral blood neutrophils. Increased neutrophils may be
due to neutrophils redistribution and more active cells into the circulation (Peake, 2002). Romeo at al., reported that Physical activity can induce considerable physiological change on the immune system, but their effect on the immune function are still under debate (Romeo at al., 2010). Data showed that variety of factors such as catecholamine release, activation of the pituitary-adrenal axis, fluctuations in plasma cytokines, and/or feedback from other leukocytes can induce alter immune responses during and following exercise (Benschop et al., 1996). Moreover, zar et al. (2012 & 2014) showed that, some factors such as type, duration, intensity, and program of the exercise and the use of different Subjects (zar et al., 2012; zar et al., 2014) and also hormonal, metabolic and psychoneural stress have effects on the immune system (Kursat et al., 2005) It is reported that increase in secretion of cortisol, cathecholamine and the after and during exercise, alter the immune functions (Bauer et al., 2002)Our data revealed that level of some immune c

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References


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