The effect of 14 days coenzyme Q10 supplementation on muscle damage markers and fatigue in inactive male

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Abstract

Background: the aim of this present study was determining of the effect of 14 days coenzyme Q10 supplementation on muscle damage markers and fatigue in inactive male.

Materials and Methods: 20 Volunteer inactive men randomly Double blind divided in 2 group. Group 1 included 10 people who Consumption coenzyme Q10 supplement and group 2 included 10 people who consumption Placebo. After 14 day of coenzyme Q10 supplementation all of the Subjects Participated in Bruce test. Blood samples were taken in 4 level.1 Basic mode-2 after supplementation-3 immediately after exercise-4- 2 hours after exercise. Ck, lactate, and cortisol measured during this 4 level.

Results: The results showed consumed 14 day coenzyme Q10 supplement impact in basic mode on muscle damage markers and fatigue. In addition 1 session exhaustive aerobic activity Increase Ck and lactate status. On the other hand CK in 2 group has not significant difference. So according to this study 14 days coenzyme Q10 supplementation May be reduce exercise-induced cell damage.

Conclusion: The present study’s results show that a session of exhaustive aerobic exercise and coenzyme Q10 supplementation have significant effects on muscle damage markers and fatigue in inactive male.

Keywords: coenzyme Q10, supplementation, muscle damage, inactive male

Introduction

Aerobic exercise activities in modern societies has become more common to health and weight loss [1, 2]. These activities may be muscle and tissue damage, facilitating the oxidation of fatty acids in the membrane and starts a chain of reactions leading to cell death is destructive [3]. For example Sacheck et al (2003) study were healthy young men and old men creatine kinase and lactate immediately after 45 minutes of running on a treadmill negative slope showed a significant increase at 75% of maximal oxygen consumption [4]. The results Sumida (1997) as well as confirmation that a significant increase in serum creatine kinase women athletes after exhaustive activity on the meter Runners [5]. Milias et al (2005) the effect of eccentric exercise-induced muscle damage levels of serum creatine kinase in the blood serum levels of total creatine kinase said that after the activity increases [6]. Ochoa et al (2007) also examine the effect of Q10 supplementation on muscle damage resulting from external-oriented activity in mice suggest that serum levels of creatine kinase after exercise significantly increases-will [7]. Also, Abdel-Nasser (2010) by examining the effects of exhaustive exercise on
some physiological variables reported that blood concentrations of lactate in basketball, cortisol and testosterone and operating time was significantly increased in both basketball and controls. But cortisol and lactate concentrations were lower than the control group in basketball. While testosterone concentration and performance when compared to the control group was reported in basketball players [8]. In this case to prevent damage caused by severe substance use and irregular physical activity and nutritional antioxidant supplements are essential. One of these supplements have antioxidant and anti-fatigue effects as a substance Coenzyme Q10 is listed in studies. It is therefore necessary to address the effects of antioxidant coenzyme Q10 supplementation on exercise-induced damages to be determined [9]. In recent years, much attention in some medical studies on coenzyme Q10 as a nutritional food supplement is taken [10, 11]. On the other hand, Zuliani (1989) reported that supplementation with coenzyme Study untrained persons Q10 (100 mg for four weeks) had no effect on biological parameters in the blood after a period of long-term supplementation and aerobic activity not on the bicycle ergometer [12]. However, in relation to the effect of coenzyme Q10 in the prevention of an increase in lactate due to the limited number of studies have been carried out various sports activities [13, 14]. Since the effects of certain short-term and long-term coenzyme Q10 supplementation on markers of muscle damage and fatigue after aerobic exercise is not specified, the present study is the effect of coenzyme Q10 supplementation on markers of muscle damage or fatigue following an exhaustive exercise in sedentary men to investigate.

**Materials and Methods**

The population of this study included healthy male students, non-athletes and non-smoking Azerbaijan Tarbit Moallem University, with an average age of 2 ± 23 years. The ad distribution company in the research, volunteers (n = 80) attended the coordination meeting and after the introduction of the whole thread, Objectives and methodology of research, by completing the informed consent form and health questionnaire and medical examinations, healthy subjects and qualified to twenty, taking into account the criteria of age, measured by maximal oxygen uptake indicator of body measurement (height, body mass, body fat percentage) and sports history and no history of illness and injury, were selected to determine sample homogeneity. Volunteers are built in the past month due to illness or medications and nutritional supplements were not natural and industrial use, and during the past year, none of the participants did not participate in regular sports activities. Height, using the wall stadiometer, body weight without clothes and with the use of electronic digital scale were recorded. A week before the start of supplementation consent forms and questionnaires fitness and health records were available to participants and they use the aerobic capacity test on a treadmill Teknojim Bruce was determined. A week later determine aerobic capacity, blood samples for the first homogenization, and determine baseline values of the indicators before starting supplementation 14 days before the elbow of the right arm vein all subjects were provided to the five milliliter of blood. To check the status of individuals, subjects randomly into two equal groups receiving the supplement coenzyme Q10 (the amount of 5.2 mg per kg body weight per day) and placebo (dextrose as a supplement during the period of supplementation), and 10 patients in each group were replaced. In the days prior to the conduct of the investigation and during the supplementation period, the subjects were asked to complete a 24-hour nutritional retention, to complete power control. In addition, they were asked to participate in heavy physical activity, and taking any anti-oxidative and anti-inflammatory drugs and supplements avoided. After completing the supplementation period (14 days) and blood aerobic activity was undertaken before the execution of the contract. The subjects for the public to warm-up exercise protocol flexibility and elasticity carried out, then they pass 10 stage Bruce test on a treadmill to treadmill. By checking blood cells in each group of 10 people randomly in two equal groups receiving supplements of coenzyme Q10 prepared by the Company Nutri Center (the amount of 5.2 mg per kg of body weight per day) and placebo (dextrose) similar to coenzyme Q10 supplement capsules were placed. Each of the subjects who were bound for 14 days, the daily one serving of this supplement. This quasi-experimental study design was a double blind (recipient of the supplement and placebo) with repeated measures (blood four times) was carried out. All stages of research operations at standard conditions of humidity 55%, and 8 am to 11 am was 25 degrees. Due to the nature and purpose of the research, descriptive statistics to report data subjects, the mean and standard deviation were used. After verifying normal distribution (Kolmogorov-Smirnov and Shapiro Wilk) and homogeneity of data obtained in the first phase (t test), hypotheses to test, analysis of variance (ANOVA) Repeated measurement, post-test Bonferroni and independent t-test using SPSS software version 18 was tested under Windows as the 0/05 significant level. In addition, the effects of confounding factors were determined using the Chi Omega.
Table 1. Summarizes the study suggests

<table>
<thead>
<tr>
<th>Groups and measured steps</th>
<th>Blood two hours after aerobic activity</th>
<th>Blood samples immediately after aerobic activity</th>
<th>Blood samples before and after the supplementation period</th>
<th>Blood 14 days before supplementation</th>
<th>Groups and measured steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Activity</td>
<td></td>
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<tr>
<td></td>
<td>10people</td>
<td>10people</td>
<td>10people</td>
<td>10people</td>
<td>Supplement group</td>
</tr>
<tr>
<td></td>
<td>10people</td>
<td>10people</td>
<td>10people</td>
<td>10people</td>
<td>Placebo group</td>
</tr>
</tbody>
</table>

Results

Table 2. Shows the Characteristics of the subjects

<table>
<thead>
<tr>
<th>Characteristics of the subjects</th>
<th>Groups</th>
<th>Mean</th>
<th>standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>Supplement</td>
<td>74.8</td>
<td>2.04</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>73.3</td>
<td>2.11</td>
</tr>
<tr>
<td>Fat percentage(%)</td>
<td>Supplement</td>
<td>15.14</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>14.87</td>
<td>1.35</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Supplement</td>
<td>23.8</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td>22.9</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Analysis of variance showed that the supplement coenzyme Q10 loading and exhaustive aerobic exercise can have a significant impact both on serum cortisol changes. Of course, Bonferroni test results indicate that the supplement coenzyme Q10 does not have any significant effect on basal cortisol. In other words, coenzyme Q10 supplements can cause significant changes in cortisol in the ground state. However, the increase in cortisol after exhaustive aerobic activity was not significant in the group receiving supplements of coenzyme Q10. But in the placebo group cortisol after exhaustive aerobic exercise significantly increased. The cortisol levels 2 hours after the exercise was less than the baseline value. The scope of cortisol in the group receiving coenzyme Q10 significantly less than the placebo group (Figure 1). In other words, we can say that coenzyme Q10 supplementation can significantly increase the range of changes of serum cortisol (stress hormone) after exhaustive aerobic activity down. The results of the analysis of variance for cell injury suggests that coenzyme Q10 supplements loading effect on serum creatine kinase. However, exhaustive aerobic exercise affects changes in creatine kinase. Of course, Bonferroni test results indicate that the supplement coenzyme Q10 does not have any significant impact on the creatine kinase base. In other words, coenzyme Q10 supplements can cause significant changes in blood creatine kinase in the ground state. However, an increase in creatine kinase after exhaustive aerobic activity in both groups was significant. Although the range of creatine kinase in the group receiving Coenzyme Q10 is less than the placebo group (Figure 2). In other words, measuring the effects of creatine kinase in the blood changes to different departments. Analysis of variance related to changes in blood lactate suggest that coenzyme Q10 supplements loading and lactate changes affect exhaustive aerobic exercise. The Bonferroni test results indicate that the supplement coenzyme Q10 has no significant effect on baseline lactate. In other words, coenzyme Q10 supplements can cause a significant change in blood lactate is the ground state. However, the increase in lactate after exhaustive exercise were significantly lower than the placebo group. In other words, measuring the effects of changes in blood lactate compared to different departments and the results of the independent t Dhdbyn lactate levels after exercise and placebo groups were significantly different (Figure 3). Therefore, the research hypothesis about the effect of aerobic exercise on blood lactate coenzyme Q10 supplements exhaustive and non-athletic men is true. It was also shown, aerobic exercise and supplementation of coenzyme Q10 affect both the changes in maximum oxygen consumption. Maximum oxygen consumption after supplementation of coenzyme Q10 supplementation of coenzyme Q10 than before significantly increased (Figure 4).
Figure 1. Changes in serum cortisol supplementation and placebo groups after supplementation, aerobic exercise and two hours of aerobic activity

Figure 2. Changes in serum creatine kinase supplement and placebo groups after supplementation, aerobic exercise and two hours of aerobic activity

Figure 3. Changes in plasma lactate supplement and placebo groups after supplementation, aerobic exercise and two hours of aerobic activity
Discussion and Conclusion

These findings suggest that supplementation of coenzyme Q10 in serum creatine kinase had no significant effect on. These findings confirmed the results Sumida (1997), based on the significant increase in serum creatine kinase women athletes after exhaustive exercise on the cycle ergometer [5]. Milias (2005) the effect of eccentric exercise-induced muscle damage on serum creatine kinase levels, noting that serum creatine kinase levels significantly increased after exercise [6]. Hamedinia (2007) as well as the significant increase in creatine kinase induced by exhaustive exercise on a bicycle ergometer noted [15]. The findings of this study Kon (2008) Hmrastast that consumed six weeks of coenzyme Q10 supplements significantly increase in creatine kinase male athletes after aerobic exercise helps prevent [9]. Wang et al (2003) concluded that the supplement coenzyme Q10 consumption of two grams per kilogram of body weight over three months in monkeys was associated with a significant reduction in serum creatine kinase [16]. The mechanism of the possible influence of coenzyme Q10 as an anti-oxidant to reduce creatine kinase is likely to be the coenzyme Q10 by removing the foundations of free and increase the antioxidant capacity of the body reduces the lipid membrane and decrease damage to membrane phospholipids are, therefore, leakage and penetration of the enzyme inside the cell into the extracellular fluid prevents [17, 18]. In the meantime, there is research that changes in these indicators are very low so that there is no significant change in the index. One of these studies can be researched Zuliani (1989) suggested that coenzyme Q10 supplementation for four weeks in non-athletes could serum creatine kinase after exercise changes have an impact [12]. Kon et al (2007) study of rats also found that 300 mg of coenzyme Q10 per day for four weeks increased creatine kinase in skeletal muscle and liver [19]. The difference in the type of antioxidant, the contracts supplementation, type of activity and the participants used can be important in view of contradictions [20, 21]. The difference in the type of antioxidant, the contracts supplementation, type of activity and the participants used can be important in view of contradictions [19, 22]. On the other hand, it was shown coenzyme Q10 supplementation on blood lactate had no effect on the ground state. The results suggested that the increase in plasma lactate after exhaustive aerobic exercise with results Sacheck et al (2003) gained [23]. Sacheck a study of healthy young men and old blood lactate immediately after 45 minutes of running on a treadmill negative slope with 75 percent of maximum oxygen consumption significantly increases. The amount in the elderly compared to the young men was significant [23]. In addition, in this study, coenzyme Q10 supplementation significantly decreased after aerobic exercise plasma lactate in the supplement group compared to the placebo is sent. This is consistent with the findings Porter et al. (1995) is in line. So that Porter human study on
endurance performance in healthy individuals revealed that 150 mg/kg of coenzyme Q10 for two weeks increased performance and a significant reduction in blood lactate levels compared to the control group [17]. Possible because it can increase the amount of Coenzyme Q10 plasma and mitochondrial coenzyme strengthen and activate the aerobic metabolic pathway that accelerates the production of adenosine tri-phosphate fatty acids and lactate production limits [24]. On the other hand, the research findings Zuliani et al. (1989) and Malm et al. (1997) based on the lack of effect of coenzyme Q10 on changes in plasma lactate post exercise four weeks of 100 mg untrained persons after aerobic exercise in contrasts[12,13]. Because, in this study, supplementation of coenzyme Q10 in the ground state could not only prevent changes in plasma lactate; but the excessive rise in plasma lactate after exhaustive aerobic exercise prevented. These findings suggest that coenzyme Q10 supplementation has no effect on blood cortisol have been in the ground state. In this regard, Tartibian et al. (2009) to investigate correlation between cortisol and plasma metabolites in a significant increase in the concentrations of runner’s young man stated that cortisol, lactic acid and plasma creatinine is seen after aerobic activity [25]. Also, Abdel-Nasser (2010) by examining the effects of exhaustive exercise on some physiological variables reported that blood concentrations of lactate in basketball, cortisol and testosterone and operating time was significantly increased in both basketball and the control group, but cortisol and lactate concentrations were lower than the control group in basketball[8]. Venkatraman at all (2001) examine the effect of fat and endurance exercise on plasma cortisol, prostaglandins E2, interferon-γ and lipid peroxidation in runners to this concluded that plasma cortisol levels after the diet and fat before exercise had gone up. In addition, the plasma cortisol levels (p<0.004) was increased after endurance exercise [26]. Possible differences in results may be due to several factors including differences in intensity and duration, the difference in age of subjects, healthy and sick subjects, differences in baseline characteristics measured, the participants practiced before test, attributed to differences in methods of measurement. The results of the research study suggests that physical activity is relatively severe oxidative stress caused by increased oxidative damage including proteins, membrane lipids, nucleic acids, and adverse changes in many indicators of inflammation and cell damage such as serum creatine kinase caused to the biological macromolecules [27, 28]. One way to deal with the adverse effects of oxidative stress caused by intense exercise and heavy use of natural antioxidant supplementation and oral materials. However, results of this study showed that aerobic exercise significantly increases muscle injury and fatigue index and supplementation of coenzyme Q10 reduces the pressure to produce serum creatine kinase, cortisol and lactate blood. However, in the field of study of the effect of coenzyme Q10 on oxidative stress resulting from aerobic activity M-Bashd more research is needed.

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Conflict of interest
The authors declare no conflict of interest

References