Effect of a periodic aerobic and anaerobic selective training with use of green tea on certain inflammatory factors and oxidative stress of male athletes

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ABSTRACT
Due to the lack of complete information on the effects of aerobic and anaerobic exercises with taking supplements of green tea on malondialdehyde (MDA), creatine kinase, cortisol, this study was conducted to examine the effects of aerobic and anaerobic selective training (resistive) associated with the consumption of green tea on inflammatory factors and indicators of oxidative stress in male athletes of 20 to 35 years of age. In this study 60 male athletes were selected and randomly divided into 6 groups: Group A: aerobic exercise with green tea, Group B: aerobic exercise, group C: anaerobic exercise (resistive) with green tea, group D: anaerobic exercise (resistive), group E: only green tea and group F were conducted just their exercises (control). Results showed that doing aerobic exercises, anaerobic (resistive), aerobic and resistive exercise with green tea may increase MDA to effect on the number of oxidative stress and inflammation factors.

KEY WORDS: GREEN TEA, ANAEROBIC EXERCISE [RESISTIVE], AEROBIC EXERCISE, OXIDATIVE STRESS, INFLAMMATION

INTRODUCTION
Oxidative stress with damage to the kinds of cellular infrastructures reduces cell and physical function and muscle damage (Alok et al., 2003), (Anne et al., 2004), (Atalay et al., 2000). Some researchers believe that by adopting different strategies in order to inhibition of oxidative stress and lipid peroxidation and its reduction can be prevented from decline of sporty performance and even take step in improving it and increasing tolerance to exercise (Maria et al., 2003). Oxidative stress occurs when that creation of reactive species that are known as free radicals, in a system of ability of the system goes beyond to neutralization and removing these molecules (Bloomer, 2007), (Bloomer and Gold Farb, 2004). Since the oxidative stress during and looking to sport occurs only if the production of reactive oxygen species caused by sport goes beyond of the body's antioxidant potential capacity (Konig et al., 2001), (Radak et al., 2001).
Green tea plant is cultivated and grown in Southeast Asia, including China, India, Japan, as well as in many African countries including South Africa (Luximo and Ramma, 2005). Tea leaves have medical consumption as well as aspect of the soda consumption in community. From 3 thousand years before Christ, traditional medicine of China have used green tea for headaches, body aches, ease of digestion, and increase in immunity defense power (safety), prevention of poisoning, and also an energizing substance, and causing lifetime (Ferrara et al., 2001). Green tea may prevent the oxidation of LDL cholesterol and thereby reduces the buildup of plaque in the arteries that thus improves cholesterol levels and cardiovascular health, and epigallocatechin – 3 – gallat (EGCG) are powerful antioxidants and the most common and most abundant polyphenols present in green tea (Murase et al., 2002).

Researchers in a study have confirmed the protective effect of green tea ([600 ml per day) 3 times per day, 200 ml of boiling water with 2 g of dry green tea] in reducing lipid peroxidation during intense resistive exercise (Panza et al., 2008). In another study also have reported green tea can increase antioxidant capacity and reduces oxidative stress caused by strength exercises with intensity of 60% (1RM) (Jowko et al., 2011). On the other hand (Call et al., 2008) in a research examined the endurance capacity of Maturity in mice MDX has increased by combining voluntary running with wheelchairs and green tea extract. The data show that every 2 of endurance training and green tea extract (GTE) as the therapeutic strategies for improving muscle performance may be useful in MDX mice. In another study (Jordan et al., 2007), they studied effects of green tea supplementation on the onset of muscle soreness and oxidative stress (oxidative stress), the workers have found that level of CK significantly increased at 24 hours after exercise.

But (Jowko et al., 2007) in a study performed by the effects of green tea extract Balance of reducing men oxidation exposed to intense strength exercises, specially muscle exercises) found these findings that muscle exercises prevents the Increasing caused by exercise in plasma CK activity and is decreased the activity of superoxide dismutase (SOD). While (Azizi et al., 2012) in his study found these results that oxidative stress of ROS in the production of inflammatory cytokines caused by exercise is effective. Against the consumption of antioxidant supplement has effective role in reducing induced cytokine production caused by exercise. In this regard, (Nakhostin-Roohi et al., 2008) the effect of supplementation of vitamin C (1000 mg) were reviewed on lipid peroxidation, muscle damage and inflammation in 16 healthy male subjects with no exercise. The results showed a significant increase in MDA in the placebo group was 2 hours after exercise. CK also 24 hours after exercise had significant increasing in the placebo group. They showed consumption of vitamin C supplement prevents lipid peroxidation caused by sports and muscle damage.

Therefore, due to contradictory results obtained and the paucity of information in the field of green tea supplementation during aerobic and anaerobic activities (resistive) and its role on some inflammatory factors and indicator of oxidative stress in athlete subsequent of this type of exercises doing detailed studies and controlled has not been studied in this area, this study has been designed.

**MATERIAL AND METHODS**

The research methodology is type of semi experimental test. The statistical population were all male athletes of Tehran which by calling 100 people voluntarily (participating). That among these (N=100) 60 people to purposefully (questionnaires) randomly selected as samples (simple) and were divided into 6 groups [5experimental groups (N=50)and 1 control groups (N=10)], (Ghasemi et al., 2012).

Including: Group A: Aerobic exercise with green tea Group B: Anaerobic exercise (resistive) with green tea. Group C: Just ate green tea, Group D: Only aerobic exercise, Group E: Just anaerobic exercise (resistance) and Group F: Just did their regular exercise (control). A week before the performing test measurements of height, weight, age and familiarity with the test methodology and receiving written consent were taken from the subjects. In addition, all subjects were in perfect physical and mental health and had no history of cardiovascular diseases, respiratory diseases and certain diseases. Before the starting from subject a pre-test and after finishing exercises, means after the 8 weeks was conducted a post-test. To 30 people of subjects was given 200 ml of green tea (2 g of dry leave green tea in 200 ml of water, (100 - 80°C) as beverage (Panza et al., 2008) and 30 others subjects were without green tea. Blood test (fasting) was used for pretest and posttest. Exercises as 3 days on a week for 24 sessions means 8 weeks and its time was 60 minutes in each training session.
AEROBIC EXERCISE

Aerobic exercises was doing aerobic exercises, which included 15 minutes of warm-up exercises (walking, softness movements, stretching movements, run and doing exercises by traction, barbell (light), ball, work on the steppe and perform a series of rhythmical movements that is 35 minutes and 10 minute cool-down that is total doing 60 minutes of aerobics that is for three sessions every other day on a week (3 days on a week) was intensity exercises between 65 to 75 percent of maximum heart rate. (Haghighi et al., 2012) (New aerobic exercises, kasten and Jordan, Volume 1) (Aerobics - education and its benefits, Veysi and Kashti dar, Volume 1)

ANAEROBIC EXERCISE (RESISTIVE)

Anaerobic exercise (resistive) that included a 10-minute warm up and then start to doing barbell training that includes 2 program as program for one to four weeks that includes 1 set and 8-12 repeat and 1-2 minutes resting.

TAKING SUPPLEMENTS GREEN TEA

In the groups that was considered taking supplement green tea the subjects were asked to maintain their diet for 8 weeks, 3 days per week the average 200 ml of green tea (2 g of dry leave green tea in 200ml water in temperature of (80-100°C) is brewed and after exercises, were given to subjects as beverage

BLOODLETTING AND MEASURING INDEXES OF RESEARCH

Bloodletting after 12 to14 hours fasting was performed in two stages of (before starting exercises means one day before starting the exercises, and after 8 weeks of exercise). In the first stage bloodletting that was done in Al-Nabie mosque gym bloodletting was carried out at 8 am from subjects that the right hand vein of each subject in a sitting position ant at rest state was taken 5 ml of blood. In the second stage also after the 8 weeks also was done in the same way. To measure the cortisol, a serum from Monobind Company in wavelength of 45’nm was used. Before starting doing work, all solutions, standards, controls and patient serum should be reached to 20 to 27°C of the room temperature. This way should be done by qualified personnel.

METHODOLOGY INCLUDES OF THE FOLLOWING CASES

To number of patients of Standard and control of Elisa microbes wells (wells within the micro plate as a square form) from kit that kept is kept at 2 to 8°C, removed and for standard and controlling samples we pour 25 microliters in each well then 50 ml of the cortisol’s enzyme solution prepared added to each of microbes and mixed thoroughly and we shake 20 to 30 seconds. For measuring serum Malondialdehyde, Nanomol / ml in wavelength of 534’nm nanometers by UV-spectrophotometry device, spectrophotometric method (HPLC) was used.

The following two methods are used for measuring MDA:1.Spectrophotometry (TBARS)2. Method of (HPLC) / 532 nm 1.MDA in serum is separated by connecting (with TBA) and serum proteins are precipitated by TCA centrifugation. Then, TBA complex is measured at a wavelength of 534 nanometers. Necessary solutions include:1.TCA solution 17.5 percent 2. TCA solution 70 percent 3. TBA solution 0.6 percent. Test methodology is as follows:

Calculation of Results: The concentration of MDA in nmol / ml is calculated by the following formula:

\[
\text{Abs (test)} - \text{Abs blank} \\
\frac{1}{56} \times 10^5
\]

Method of HPLC after sample preparation for measuring MDA prepared solution by syringe for the device of HPLC injected and in wavelength of 532 nm in standard of determined concentration of MDA and MDA we obtain samples by using the standard curve (AL -Anee et al., 2009).

WAY OF MEASURING THE CREATINE KINASE

For measuring creatine kinase (CK - MB), micro liter in 340’nm wavelength with the Cubas auto analyzer device and photometric method was used.

Method: (DGKC), (Deutsche Gesellschaft für clinical chemistry (DGKC) and (IFCC), (International Federation of clinical chemistry (IFCC)). Test methodology: wavelength: 340 nanometers, cuvette diameter: one centimeter, temperature 37°C, and measurement: photometer with Blank consumption is set to zero. (Stein et al., 1998), (Moss et al., 1999), (Ürzburg et al., 1977).

STATISTICAL METHODS

For recognizing and naturalization of data, Kolmogorov and Smirnov test has been used and it was identified that groups are not different from each other. Descriptive statistics was used in order to calculating central indexes and dispersion was used. Inferential statistics was used for unilateral variance analysis statistical test and tukey post hoc test. Significance level was considered as alpha 0.05. All statistical operations were done through SPSS software version 20.
RESULTS AND DISCUSSION

First hypothesis: Part I: Investigating effect of aerobic exercise and green tea on the three variables of MDA, CK and CORT Null hypothesis: Aerobic exercise along with green tea has no significant impact on the amount of MDA of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting MDA did not show a significant difference between changes in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control ($F_{3,36} = 1.124, \text{Sig} = 0.352$) Table 1 shows one-way variance analysis test results for comparison of the amount of changes in plasma resting MDA in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control.

SECOND HYPOTHESIS

Null hypothesis: Aerobic exercise along with green tea has no significant impact on the amount of CK of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CK did not show a significant difference between changes in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control ($F_{3,36} = 3.417, \text{Sig} = 0.027$) Table 2 shows one-way variance analysis test results for comparison of the amount of changes in plasma resting CK in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control.

THIRD HYPOTHESIS

Null hypothesis: Aerobic exercise along with green tea has no significant impact on the amount of CORT of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CORT did not show a significant difference between changes in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control ($F_{3,36} = 0.721, \text{Sig} = 0.546$) Table 3 shows one-way variance analysis test results for comparison of the amount of changes in resting CORT in four groups of aerobic exercise along with green tea, aerobic exercise, green tea, and control.

PART II: INVESTIGATION THE EFFECT OF AEROBIC EXERCISE (RESISTANCE) AND GREEN TEA ON THREE VARIABLES OF MDA, CK AND CORT

Forth hypothesis: Null hypothesis: Resistive exercise along with green tea has no significant impact on the amount of MDA of male athletes of 20 to 35 years old.

<p>| Table 1: Test Results One way ANOVA for amount of resting plasma MDA changes of four groups of research |</p>
<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>d</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>0.154</td>
<td>3</td>
<td>0.051</td>
<td>1.124</td>
</tr>
<tr>
<td>Within group</td>
<td>1.648</td>
<td>36</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.803</td>
<td>39</td>
<td></td>
<td></td>
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</tbody>
</table>

<p>| Table 2: one-way variance analysis test results for the amount of changes in plasma resting CK in four study groups |</p>
<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>D</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>90.1749</td>
<td>3</td>
<td>58.30</td>
<td>3.417</td>
</tr>
<tr>
<td>Within group</td>
<td>0.6146</td>
<td>36</td>
<td>17.05</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>90.7895</td>
<td>39</td>
<td></td>
<td></td>
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</tbody>
</table>

<p>| Table 3: one-way variance analysis test results for the amount of changes in plasma resting CORT in four study groups |</p>
<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>d</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>148.51</td>
<td>3</td>
<td>17.49</td>
<td>0.721</td>
</tr>
<tr>
<td>Within group</td>
<td>828.850</td>
<td>36</td>
<td>23.634</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>976.901</td>
<td>39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results of one-way variance analysis test for comparison of the amount of changes in plasma resting MDA showed a significant difference between changes in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control ($F_{3,18.86} = 3.276, \text{Sig} = 0.044$)(There was no homogeneity of variance between forth groups, so Welch amendment has been done). Table 4 shows one-way variance analysis test results for comparison of the amount of changes in resting MDA in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control.

**FIFTH HYPOTHESIS**

Null hypothesis: Resistive exercise along with green tea has no significant impact on the amount of CK of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CK showed a significant difference between changes in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control ($F_{3,16} = 4.132, \text{Sig} = 0.013$). Table 5 shows one-way variance analysis test results for comparison of the amount of changes in resting CK in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control.

**SIXTH HYPOTHESIS**

Null hypothesis: Resistive exercise along with green tea has no significant impact on the amount of CORT of male athletes of 20 to 35 years old. The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CORT showed a significant difference between changes in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control ($F_{3,16} = 8.301, \text{Sig} = 0.000$). Table 6 shows one-way variance analysis test results for comparison of the amount of changes in resting CORT in four groups of resistive exercise along with green tea, resistive exercise, green tea, and control.

**PART III: COMPARISON OF THE EFFECT OF AEROBIC EXERCISE AND ANAEROBIC (RESISTANCE) AND GREEN TEA ON THREE VARIABLES OF MDA, CK AND CORT**

Seventh hypothesis: Null hypothesis: There is no significant difference between the impact of aerobic exercise along with green tea, and between resistive exercise along with green tea, and green tea on the MDA of male athletes of 20 to 35 years old. The results of one-way variance analysis test for comparison of the amount of changes in plasma resting MDA did not show a significant difference between changes in six study groups ($F_{5,24.28} = 2.256, \text{Sig} = 0.081$) (there was no homogeneity of variance between four groups, so Welch amendment has been done). Table 7 shows the results of one-way variance analysis test results for comparison of the amount of changes in plasma resting MDA in six study groups.

<table>
<thead>
<tr>
<th>Table 4: one-way variance analysis test results for the amount of changes in plasma resting MDA in four study groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistic</td>
</tr>
<tr>
<td>Amendment of Welch</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: one-way variance analysis test results for the amount of changes in plasma resting CK in four study groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of squares</td>
</tr>
<tr>
<td>Intergroup</td>
</tr>
<tr>
<td>Within group</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6: one-way variance analysis test results for the amount of changes in plasma resting CORT in four study groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of squares</td>
</tr>
<tr>
<td>Intergroup</td>
</tr>
<tr>
<td>Within group</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
EIGHTH HYPOTHESIS

Null hypothesis: There is no significant difference between the impact of aerobic exercise along with green tea, and between resistive exercise along with green tea, and green tea on CK of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CK showed ($F_{5,24} = 4.098$, $\text{Sig} = 0.008$) (there was no variance homogeneity between four groups, so Welch amendment has been done). Table 8 shows the results of one-way variance analysis test results for comparison of the amount of changes in plasma resting CK in six study groups.

NINTH HYPOTHESIS

Null hypothesis: There is no significant difference between the impact of aerobic exercise along with green tea, and between resistive exercise along with green tea, and green tea on CORT of male athletes of 20 to 35 years old.

The results of one-way variance analysis test for comparison of the amount of changes in plasma resting CORT showed a significant difference between changes in six study groups ($F_{5,14} = 7.172$, $\text{Sig} = 0.000$). Table 9 shows the results of one-way variance analysis test results for comparison of the amount of changes in plasma resting CORT in six study groups.

The present study showed that doing aerobic, anaerobic (resistance) exercise, and aerobic and resistance exercise along with green tea may increase MDA and affect some factors of oxidative stress and inflammatory. Researchers believe that although different cells and textures of body produce free radicals as a part of metabolism but sometimes such as during work and physical activity, producing these radical species will go beyond body’s antioxidant capacity and will lead to oxidative stress (Bloomer et al, 2005). Green tea as a strong antioxidant supplementary paly and effective role in neutralization free radicals and increasing the capacity of body’s antioxidant system and reducing lipid peroxidation (Kuriyama et al, 2008) and (Yuan et al, 2011).

In extreme resistance exercises, the process of ischemia and reperfusion and mechanical loads exerted on the involved soft tissues have effective role in the creation of lipid peroxidation and the production of free radicals (Dixon et al, 2006). During exercise diversion of blood to the skin and active muscles cause transient tissue hypoxia and lack of coordination of active oxygen consumption and oxygen requirements in the active textures during high intensity exercise; although following re-oxygenating of these textures and cutting off or reducing the intensity of activity, producing reactive oxygen species (ROS) will be provided with increasing lipid peroxidation and cell function decline (Ogonovszky et al, 2005) and (Watson et al, 2005). Catechins found in green tea can increase the capacity of antioxidant through increasing intracellular antioxidant such as glutathione, uric acid and bilirubin and increasing the capacity of intracellular antioxidant enzymes such as glutathione reductase and glutathione peroxidase and catalase in protecting cell against depletion of reduced glutathione and by this mechanism help increasing TAC (Raihan et al, 2009).

Generally these compounds because of having hydroxyl groups can neutralize free radicals and can act as the electron or hydrogen donor (Katiyar et al, 2007). Catechins found in green tea especially (EGCG) may inhibit the process of lipid peroxidation through reducing the production of free radicals (mainly because of having dihydroxy phenol structure) as well as reconstruction of tocopher (converting tocopher to tocopher radical). Through connecting copper element and preventing connecting this element to lipoproteins, Catechins can significantly prevent reducing tocopher

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**Table 7: one-way variance analysis test results for the amount of changes in plasma resting MDA in six study groups**

<table>
<thead>
<tr>
<th>Amendment of Welch</th>
<th>Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>256.2</td>
<td>6</td>
<td>24.28</td>
<td>0.081</td>
<td></td>
</tr>
</tbody>
</table>

**Table 8: one-way variance analysis test results for the amount of changes in plasma resting CK in six study groups**

<table>
<thead>
<tr>
<th>Amendment of Welch</th>
<th>Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>098.4</td>
<td>5</td>
<td>24.77</td>
<td>0.008</td>
<td></td>
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</tbody>
</table>

**Table 9: one-way variance analysis test results for the amount of changes in plasma resting CORT in six study groups**

<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>D</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>1094.021</td>
<td>5</td>
<td>218.804</td>
<td>4.172</td>
</tr>
<tr>
<td>Within group</td>
<td>1647.365</td>
<td>54</td>
<td>30.507</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2741.386</td>
<td>59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
concentrations in plasma and cause a delay in beginning the process of plasma lipid peroxidation. (Ostrowska et al, 2006).

Recently, Ghasemi et al, (2013) have reported the consumption of green tea for 14 days as the reason for increasing TAC significantly and significant decrease of MDA by intense resistance activity with the strength of 85% (RM1) in health non-athlete women and also in a research that (Alkhamees et al, 2013) did, they found out that through using Moran consumption [Portugal Osage], (15 and 30 milligram/kilogram/day) for five weeks that with Moran treatment (Portugal Osage: The most potent semi has been green tea and considering misalignment (Gha- set al, 2013), male or female) because on the contrary of (Alkihamees et al, 2011) in current research, the type of done done exercise 65 to 75 percent of maximum heart rate and on the contrary of (Swamy et al, 2011) in current research, it can be said that all participants were healthy athlete men. The researches have also showed that Malondialdehyde is a secondary product of lipid peroxidation that is measured as the index of oxidative stress (Ghasemi et al, 2012) and final product of oxidation of lipid peroxidation is in lipid membrane of cells in the body that inflammation processes have been increased there and in case of neutralization by body’s respiratory system can damage structure and function of cell membranes of the body (Devasagayam et al, 2004) and (Nielsen et al, 1997).

We have some evidences out of recent researches that intensive physical activity not only long-term aerobically but also in short-term anaerobic may stimulate oxidative stress (Alessioet al, 2000). It was assumed that oxidative stress more likely will help the fatigue and damaging muscle cells and as result it may affect sport performance (Watson et al, 2005). One of the effects of oxidative stress is intensification of lipid peroxidation which is reflected by increasing blood concentration with its products that is Hydroxy fatty peroxidase (LOOH), MDA as well as Thiobarbituric substances with acid reactive (TBARS) (Davies et al, 1982). In done researches by (MC Bride et al, 1998), intense resistance training stimulates increasing in MDA concentration in blood which in higher level before exercise was maintained even till 24 hours. Most of researches have also showed that one level of boring exercise or intensive sport activity or in long period cause increasing the index of oxidative stress (MDA) and decreasing the capacity of total serum antioxidant (Tauler et al, 2006) and (Jafari et al, 2011).

In spite of this, one hand available oxygen increase production of free radicals and along intensive physical activities which we face increasing consuming oxygen their producing will reach to several times of the resting mode (Tauler et al, 2006), Malondialdehyde or MDA as a free radical is a deformation of hydrogen peroxide (H2O2) that is effective on creation of conditions of oxidative stress and blood, MDA of tissue damage (Tauler et al, 2006). Increasing the concentration of MDA in blood is also dependent on the intensity of sport and whatever the intensity of activity is more, production and releasing MDA will increase as well (Valado et al, 2007).

Considering that one of the very likely mechanisms involved in cell damage is increasing leakage of free radicals and oxidative stress caused by them, Malondialdehyde index which represents the value of lipid peroxidation (Cell membrane lipid oxidative damage), it was investigated as possible mechanisms involved in causing harm (Chiaradia et al, 1998) and (Frankiewicz-Jozko et al, 1996). Also considering that glutamine is the precursor of glutathione so glutathione can decrease lipid peroxidation and free radicals through increasing the capacity of plasma antioxidant (Cogtgrave et al, 1998). On the other hand the reaction of free radicals with cells skin will lead to produce one of the stress indexes that provide the possibility of measuring oxidative stress indirectly by an oxidative called Malondialdehyde (Bride et al, 1999). Considering the implemented researches, it can be said that other factors related to type of exercise, sports field, exercise intensity, exercise duration, type of training, supplements, supplementation dose, gender, samples (human or animal model) and other factors can also be effective on decreasing or increasing MDA.

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Naghmeh, Shahla and Asghar

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