The analysis of the effects of changes of serum lipid and lipoprotein of active athletes during the competitions on Malondialdehyde (MDA) and Glutathione Peroxidase (GPX)

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Abstract: The main aim of this study is to conduct the period of training of active athletes competitions blood lipids (triglycerides, cholesterol) and lipoprotein (HDL-C, LDL-C and VLDL) changes in levels of malondialdehyde (MDA) and glutathione peroxides (GPX) levels and to investigate the related effects in this regard. The research group is consisted of twenty volunteer athletes participated in seasonal training within the program of training sessions on a regular basis. Blood samples were taken at the end of the season and before the competition season and plasma MDA, GPX serum, blood lipids and lipoproteins were analyzed in this case. According to the working group cases for the comparison of pre-and post-test analysis of HDL-C ($p < 0.05$) and GPX ($p < 0.01$), significantly differences in the related research were found. Competition of post-MDA levels in serum TG, VLDL and $p < 0.01$ was showed difference between the levels. As a result, the working group making a regular practice of lipid peroxidation did not increase due to the adaptation of MDA in understanding the changes. GPX's recent emergence is due to the cause of low measurements and the fact that athletes could be considered as having an adequate antioxidant defense system. [Fatih Kıyıcı. **The analysis of the effects of changes of serum lipid and lipoprotein of active athletes during the competitions on Malondialdehyde (MDA) and Glutathione Peroxidase (GPX).** *Life Sci J* 2013; 10(8s):394-398] (ISSN: 1097-8135). http:www.lifesciencesite.com. 64

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Introduction

Intensity and the duration of physical exercise may lead to oxidative stress. Accordingly, the defense capacity of the cells during exercise exceeds antioxidants and free radicals increasing the level of lipid per oxidation that it is thought to be occurred in this case (Leaf 1997; Schröder, 2000). Lipid per oxidation is one of the ingredients resulting from the malondialdehyde (MDA) that it is used as an indicator of oxidative stress. MDA is a by-product of lipid per oxidation, the most frequently studied in terms of exercise parameter (Dudek et al 1994, Wozniak et al., 1994). Lipid peroxidation has the most damaging effects on free radicals consisting of structural and functional damage to the cell membranes from lipid per oxidation. Lipid per oxidations is implicated in the cell death during oxidative stress (Jenkinson, 1989, Michiels et al. 1994). It may be thought that size of the damage occurred in the body can affect the time of the regeneration of the athletes. However, regular exercise indicates the strengthening of antioxidant defense (Kiyici et al 2010).

GPX is an intracellular antioxidant and antioxidant enzymes that it is the most efficient one in this case. The destruction of hydro peroxides in the cell is a question yet. (Armstrong, 1998). Several studies have shown an increase in GPX activity expressed in muscle and endurance exercises (Leeuwenburg et al., 1994; Somani et al., 1995). Results in an increase in plasma GPX overload training athletes observed an increase in erythrocyte (Palazzetti et al., 2003).It is the focus of many investigators interested in the effect of exercise on lipids because of exercise, while reducing body weight and fat stores, blood total cholesterol (Total-C), total lipid levels, serum triglycerides, low-density lipoprotein cholesterol (LDL), moderate reductions in, anti atherogenic HDL cholesterol (HDL-C) levels caused by the observed increase. This effect of exercise on serum lipid levels leads to reductions in cardiovascular risk factors (Tran et al., 1985, La Monte et al. 2011). Normative blood fat values in the literature are HDL-C: 41 to 59 mg / dL, TC: 200 mg / dl six, Triglycerides: 150 mg / dL, the six values (in some studies 40-160 mg / dL), and 500 to 750 mg of total lipid / dL (Ugras 1999). The effects of regular exercise on lipid parameters, individual characteristics, physical machining conditions, exercise type, duration, intensity, and varies have been established according to different initial lipid levels. Exercise, Total-C, LDL-C and TG and HDL-C increase results in reductions in (Tran et al. 1985).

Materials and Methods

Ethics Committee Approval of the study

This study was conducted with the approval of the Ethics Committee of Institute of Health sciences of Ataturk University.

Participants:

The study group includes the following options: mean age 21.5 ± 0.97 years and an average height of 186.4 ± 8.86 cm which is composed of twenty volunteers and active athletes. The main purpose of the study was to explain the written consent. Competition period, blood samples were taken before and band competitions were also fulfilled at the end of the period.

Taking Blood Samples:

The study group blood samples were taken from normal (gel), and then transferred to biochemical tubes to be centrifuged at 3500 rpm for 5 min. After centrifugation, the supernatant plasma fraction of the blood taken into eppendorf tubes at -80 ° C until analysis was maintained. Blood samples of lipids (triglycerides, cholesterol), and lipoproteins (HDL-C, LDL-C and VLDL) and MDA and GPX were calculated. COBAS serum lipid values 600 (Roche) were measured at the brand auto analyzer. Serum samples of Malondialdehyde Assay, Glutathione peroxides assay type and ELISA using commercial kits MDA and GPX levels were measured by radioimmunoassay.

Data Analysis:

The data obtained from the study program SPSS 15.0, Windows statistical package descriptive statistics (mean and standard deviation) were made to compare the values before and after the period of competition "Two Related Samples Tests-Wilcoxon" test on blood lipid and lipoprotein levels, antioxidant levels. To determine the effect of the study, "Bivariate Corelasyon-Spearman" tests were applied as well.

Results

Table 1: Active serum lipid and lipoprotein values of athletes in pre-and post-test results

Variables (mg/dl)	Time	Mean±SD	Z	P
Triglyceride	Pre test	159.20±92.96	-0.153	0.878
	Post test	150.70±87.31		
Cholesterol	Pre test	157.60±34.66	-1.581	0.114
	Post test	149.10±32.57		
HDL-C	Pre test	39.80±9.00	-2.313	0.021*
	Post test	35.50±9.360		
LDL-C	Pre test	85.10±24.75	-0.700	0.484
	Post test	88.00±24.84		
VLDL	Pre test	31.70±18.49	-0.153	0.878
	Post test	30.10±17.43		

*** P <0.05**

Table 2: Values of Active Antioxidant in Pre-and post-test results of athletes

Variables (mg/dl)	Time	Mean±SD	Z	P
MDA	Pre test	10.29±6.06	-0.562	0.574
	Post test	9.07±3.42		
GPX	Pre test	13.77±5.63	-2.703	0.007*
	Post test	1.37±1.05		

*** P <0.05**

Table 3: Pre-Competition Period Antioxidant Serum Lipid and Lipoprotein Levels with the Spearman correlation coefficient

	Triglyceride (mg/dl)	Cholesterol (mg/dl)	HDL-C (mg/dl)	LDL-C (mg/dl)	VLDL (mg/dl)
MDA	-0.231	-0.018	0.526	-0.064	-0.231
GPX	-0.115	-0.073	0.238	-0.165	-0.115

Table 4: Post-Competition Period Antioxidant Serum Lipid and Lipoprotein Levels with the Spearman correlation coefficient

	Triglyceride (mg/dl)	Cholesterol (mg/dl)	HDL-C (mg/dl)	LDL-C (mg/dl)	VLDL (mg/dl)
MDA	0.828 **	0.583	-0.374	0.480	0.828**
GPX	0.321	0.394	-0.309	0.450	0.321

**** P <0.01**

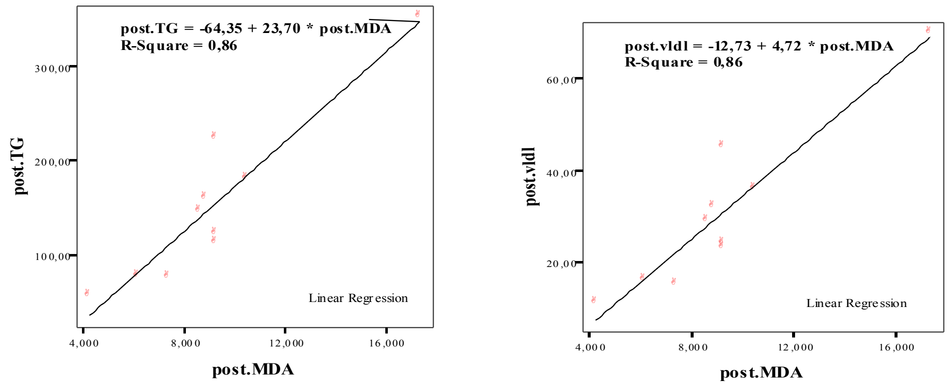

Figure 1: Serum TG and VLDL correlation graph of the final test of the MDA

Discussion and Conclusion

Many studies have reviewed the effects of exercise on antioxidant capacity and lipid profile handling issues. Studies with groups of athletes immediately before and after exercise are comparable in each other, and some specific exercise program examined the effects of a period after the application (Tanasescu et al. 2000; Blumenthal et al., 1991; Kiyici et al. 2012). In general, the difference in this study compared to other studies with active athletes to measure before and after the training program without being subjected to any test routine. Sporting experiences of athletes were asked to investigate the long-term chronic effects. According to the findings of the study, serum lipid and lipoprotein levels of athletes known to be within the normal range were compared before and after the competition season. Total-C, TG, and the decline appear to be insignificant increase in the serum LDL-C. But statistically it is significant that a decrease in serum HDL-C value of expression can be appeared (Table 1). Although there are some studies, regular aerobic exercise, the study period (4 weeks), Total-C, TG, LDL-C levels, lower HDL-C level are adequate but not sufficient to increase the stated (Lean et al., 2001). Although this result is contrary to the expectations of the outcome of this total-K's fall, but it is depending on the research results in this direction and it can be said that this has been occurred in this regard (Gursoy, 2008). A lot of studies about exercise by 6.3% in total cholesterol, LDL cholesterol by 10.1%, total cholesterol / HDL ratio of 13.4% with a reduction in HDL cholesterol luxury caused by an increase of 5% indicated have been achieved as well. Exercise, total-C, LDL-C and TG also have been shown to lead to increases in HDL-C and decreases (Tran et al. 1985). The structure of HDL-C and other antioxidants holds more types of lipoproteins. These antioxidants prevent the oxidation of lipoproteins (Onat et al, 2002). Different activity levels reported to cause different effects on antioxidant mechanisms of defense. As to length at the same time and intensity of exercise of lipid per oxidation are known to occur and an indication of this MDA (Dudek et al 1994, Wozniak et al. 1994). According to the results of this study there are no necessarily significant changes in values of MDA (Table 2), after a period of competition between MDA but a significant correlation were found TG and VLDL. Maximum speed before and after exercise, a significant decrease in serum MDA levels were detected after a four-week program is the same test to measure any difference (Kiyici et al. 2010). Similarly, the high-intensity aerobic exercise MDA 's alter (Alessio et al, 2000), yet another study, was subjected to the exercise intensity of 40% VO2max reduced MDA levels and 10.3%, while 70% VO2max intensity exercise does not create a significant difference in the levels of MDA stated (Lovlin et al. 1987). Similar results have been identified in many studies (Duffaux et al, 1997; Grisham et al., 1992; Dernbach et al., 1993). On the other hand, several studies reported that the significant changes in: (Kiyici et al. 2012; Onat et al., 2002; Child et al,. 1998). According to the results of this study it indicates significant decrease in GPX values (Table 2). Parallel to the results of our study Balakrishnan et al. (1998), Rose et al (2006) have found that the studies were done in this case as well. Ultra-endurance athletes in the study of oxidative stress before and after the contest triathlon activities were compared with half-and full-makers. MDA has been considered as an indicator of oxidative stress and antioxidant activities of GPX examined. Consequently, MDA significantly increased in the half triathlon runner, a significant reduction was seen at a GPX (Knez et al. 2007). Many researchers, after periods of acute maximal exercise endurance type training it did not detect changes in the activity of GPX (Miyazaki et al., 2011, Oztasan et al., 2004). On the other hand if there is an increase in some studies: (Elousa et al. 2003, Fatouros et al., 2004 Revan et al. 2008) the reason for these differences is subjected to the use of oxygen that is less than the antioxidant superoxide radicals and its derivatives. However, a significant increase in the rate of oxygen consumption during exercise these defense mechanisms happened that able to stay with the formation of free radicals and this can result in cell damage (Hatao et al., 2006). As a result, after long-term training and competition, there has been a significant decrease in HDL-C levels and GPX fond. As an indicator of lipid per oxidation, the decrease in MDA level is not important. According to the results, despite the decline in antioxidant GPX athletes who are already active in developing, the strengthening of physiological adaptation is blocked or the weak structure can be due to the status of lipid peroxidation.

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