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THE CHRONIC EFFECT OF SPEED EXERCICES OF FOOTBALL PLAYERS ON THE NITRIC OXYDE (NO) LEVEL

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Abstract

Target: We aim to analyze of speed tests' chronic effect on nitric oxide for footballers.

Method: In the our study; we searched physical efficiency in 30-60 minute by medium stress and 3 days a week (for 8 weeks); and also at the beginning and ending of programme speed test was applied (20mt). While resting period and after the test; blood examples were sampled.

Findings: In the test results before the program; before speed test serum NO levels were 25.5911 ± 1.5; after speed test result were 19.6161 ± 2.0. This decrease on serum NO level does not have any meaning as statistical ($p>0.001$).

In the test results after the program; before speed test serum NO levels were14.8348 ±1.36 iken; after speed test result were 11.7881 ±1.30. This decrease on serum NO level does not have any meaning as statistical ($p>0.001$).

Result: By the making sport regularly and efficiently; it makes strengthen hormonal system, immun system and cardiovasculer system, helps to increase muscle mass; but maximal exercises which made tired to body NO levels might be decrease. However; although decreasing on NO levels, we are expecting that rising on levels at the resting period.

Key words: Nitric Oxide, Speed test, Oxidative press

Introduction

Nitric oxide (NO) is a colorless, stabile gas which can be solve in water and which can be oxidizes easily to nitrite (NO_2) and nitrate (NO_3^-) with a half-life of 30 second. (A. Kuyumcu, A. Düzgün, M. Özmen, H. Besler, 2004) It takes a part in cases of several illness in several functions of organism. It is produced by almost every cell and displays activity on every cell. So, NO is a general agent molecule. In case of contact with air it react rapidly with oxygen and transforms to Nitrogen dioxide (NO_2). Nitrogen dioxide is a toxin gas which can cause tissue damage (C. Borland, T. A. Higenbottam, 1989).

The NO radical react with other free radicals and prevents over accumulation of free radicals in tissues (B. Matthew, D. Jourdheuil, D. Wink, 1999). Other free oxygen radicals are harmful in all concentrations, but NO play a part in arrangements of several important physiological events such as: arrangement of blood pressure and digestive system, host defense and nonspecific immunity. But, if it is produced in an unsuitable place and overabundance it causes to arise several pathological situations (O. Nitrik, 2000).

In exercise, the amount of blood that passes through coronaries provide an enlargement of veins and thus, more blood reaches to every departments of hearth. Regular aerobic trainings reduce the blood pressure in hyper tension. But its effect in violent hypertension is a little (A. Pehlivan, 2000).

In sport exercises, the organism is exposing to charges above the daily life level. In exercise, the duty of blood is to compensate metabolic and O_2 needs of tissues. The blood pressure is a power which provides the blood flow. The blood pressure (tension) is the pressure that the blood compress to the walls of veins (inner walls) (M. Günay, K. Tamer, I. Cicioğlu, 2006)

The effect of nitric oxide is aimed at enlargement of veins and acceleration of blood flow. Nitric acid keeps bloodstream in order and provides that the veins remain clear. The veining which is rich in terms of NO is greasy like teflon and when preventing the enlargement of coagulum by draining plaques fluently, the unhealthy vein namely the vein poor in terms of NO, give rise to accumulation of plaques in sticky inner walls of veins (J. Louis, Ignarro (Çeviri) Ö. Öztürk, 2007).

Until 90's, in several studies it is demonstrated that regular physical activity has an important role in therapy and avoiding from several diseases especially, cardiovascular diseases.

But it wasn't known what or which actors cause useful effects of physical exercise. Since the discovery of NO molecule, several studies have finished, in these studies the effects of physical exercises upon endothelium cells have been evaluated and it is seen that the production of its factors that relieve body and correlation are provided by useful products which are produced during physical exercises (W. Sessa, K. Pritchard, N. Seyedi, J. Wang, T. Hintze, 1994, Y. Higashi, S. Sasaki,N. Sasaki, K. Nakagawa, T. Ueda, A. Yoshimizu, et. al., 1999, B. Kingwell, 2000, M. Delp, 1993, K. Roberts, R. Barnard, A. Jasman, T. Balon, 1999).The aim of this study is the investigation of the effect of speed exercises of football players during 8 weeks upon nitric oxidelevel.

Material and method.

The Choice of Subjects

This study is made upon 18 active amateur football players between 19-30 ages who don't have any health problems. In the study, the goal of study and

possible risks are explained to subjects and their written consents are obtained.

Method

After a warming time of 20 minutes at a synthetic floor in an area closed to subjects, the tests have performed. The test is consisting of 10 sprint of 20 meter and jog-trot of 50 meter. Subjects have completed their first race when they feel themselves ready (before the start command) by starting at maximum speed from zero point where the start photocell is placed. The same systems have repeated in 10 sprints that have done. The blood measurements have done two times: before and just after the overload.

Equipment

Velocity measurement: In the start and finish it is benefited from photocell, and in the determination of racecourse it is benefited from cones.

The measurement of Height and Weight: For the sportsman of experimental group the measurements of height are taken in cm and weight are taken in kg and are measured in bascule that measure height

Blood Analysis: In heparinize blood examples that are taken from antekubital veins NO (nitric oxide) levels are determined. The blood examples are taken before and after the overload.

Taking Blood Examples: Blood examples are taken in normal biochemistry tubes and in tubes with EDTA. The examples that are taken to tubes with EDTA are rummaged during 3-5 minutes, are kept waiting during 5-10 minutes in room temperature and then centrifuged during 5 minutes at 3500 rpm and elements are precipitated, the plasma that remain on top are taken into ephendorph tubes they are kept until the day of analysis at – 80ºC.

***Analysis of Nitric Oxide* (NO):** NO radical which is very short-lived quickly oxidize to NO^{-2} and $NO^{-3.}$ Therefore, when determining NO amount, the amounts of NO^{-2} and NO^{-3} are also determined. Especially the determination of absorbance of the color that is formed as a consequence of interaction with Griess reactive of NO^{-2} is in use widespread. Existing NO^{-3} is measured after redacting to NO^{-2} with nitrate reductase. (S. Dong-Ju and F. O. Tımothy, 2003)

***Reactive that is used*:** Zinc sulfate, reactive of Griess, NADPH, FAD, nitrate reeducates lactase dehydrogenize, sodium private and potassium nitrate stock solution.

Specification of Nitrate: The serums that are taken at **-**80^0C are kept at -20^0C and then at 4^0C for a while and after, they completely dissociate.

Statistical Analysis

Supplementary statistic (average and SD) that belong to skier within research are made. T test is applied for comparison of biochemical and hemogram values th at are taken before and after sprint exercises. In the analysis of research data SPSS 11.5 statistic program is used.

Symptoms

Table 1: Age (year), height (cm) and weight (kg) values of football players.

	N	Minimum	Maximum	Average
AGE		19.00	30.00	23.53 □ 3.6
HEIGHT	18	1.60	1.83	1.73 □ 0.05
WEIGHT		60.00	75.00	67.84 □ 5.1

Table 2: Serum NO (U/ml) levels of football players before and after the performance test that have done before the bimonthly practice.

	N		X ± SD	T	P
Serum NO U/ml	18	**Pre**	25.59±1.59	2.216	.041
		Post	19.62±2.07		

Before the speed test the NO level of serum is 25.59 □ 1.5 and after the speed test the NO level of serum is 19.62 □ 2.07. This decline of serum level is not statistically meaningful (p>0.001).

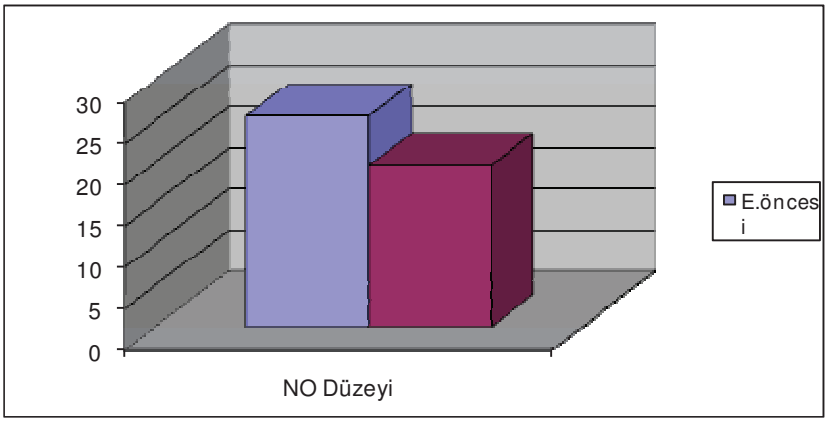

Figure 1: Serum NO (U/ml) levels of football players before and after the performance test that have done before the bimonthly practice.

In Table 2 and Figure 1 the NO levels of serums before the application of monthly exercise program before and after the speed test of our group which consist of football players are shown.

Table 3: Serum NO (U/ml) levels of football players before and after the performance test that have done after the bimonthly practice.

	N		X±SD	T	P
Serum NO U/ml	18	**Before**	14.83±1.37	1.374	.187
		After	11.79±1.30		

Before the speed test the NO level of serum is 14.8348 □1.36 and after the speed test the NO level of serum is 11.7881 □1.30. This decline of serum level is not statistically meaningful (p>0.001).

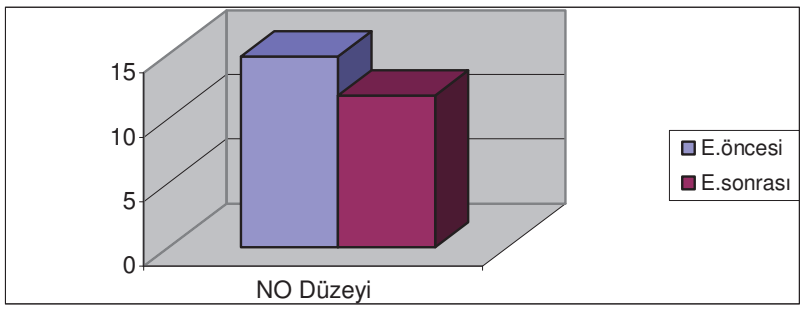

Figure 2: Serum NO (U/ml) levels of football players before and after the performance test that has done after the bimonthly practice.

In Table 3 and Figure 2 the NO levels of serums after the application of monthly exercise program before and after the speed test of our group which consist of football players are shown.

Discussion and result

In protection of structural entireness of cells and tissues and in performing their normal functions the protection of existing balance between oxidant and antioxidant system is very important. Protective antioxidant system remains incapable against oxidative stress that was raised extremely because of several diseases of organs and tissues or any other agents (like exercise). As a consequence of this situation, the illness advances and moreover, several complications come alog (A. Vliet, C. Cross, 2000).

In some studies, it is shown that there is a connection between the rise of oxygen consumption in physical exercise and the production of free radicals (B. Chance, H. Sies, A. Boveris, 1979).

For each 25 O_2 molecule that was reduced by normal respiration it is estimated that one free radical is produced (C. Sen, 1995).

The studies that have done in recent years, shows that there can be an increase in NO production with exercise and this increase can build up a protective effect on cardiovascular system in long term. With the revelation of NO, elasticity of veins augment and can play a role that prohibit the growth and function of atherosclerosis in endotheliums (Chandan K. S., 2000).

Balon and Nadler show that chronically exercise reduces the synthesis of nitric oxide in mices (T. Balon, J. Nadler, 1994).

Contractile activity increases NO production significantly in muscle. This increase that is related to contractile activity in NO production is seen to be related to increases in intracellular calcium levels. One of main effect of NO in musculoskeletal metabolism is increase in dispersion and perception of combustible substrates with the effect of vasodilator (M.S. Wolin, T.H. Hintze, W. Shen, Hk. M. Mohazzab And Y.W. Xie, 1997).

Christian and et al have indicated that nitric oxide synthesis increases in acute exercises in the study that they have done with mices. They also have told that NO have a key role for the transfer of blood sugar in musculoskeletals (K. Christian, R. Roberts, R. James Barnard, A. Jasman And Thomas W. Balon, 1999).

In the study that have done with rats, Perez and et al have found a meaningful increase in plasma nitrate values in accordance with control values after anaerobic exercises (C. Andrea, Perez. Cesar Cabral De Olıveıra Julıo G. Prıeto. Ana Ferrando, Luzdıvına Vıla Ana, I. Alvarez, 2002).

In the study that have done by Jungestern and et al they have compared long distance runners and students who don't do regular exercises and they found a meaningful difference in NO levels of long distance runners after exercise with respect to before the exercise. In the same study there is a meaningful increase in NO levels after doing exercise in accordance with the values that have measured with students who don't do regular exercises (S. Moncada, A. Higgs, R. Furchgott, Xiv, 1997).

In other study, it is seen that the handle of nitric oxide synthesis and active blood supply reduces after dynamic knee extensor exercises. In the same study, it is also seen that the handle of NO is greater in heavy exercises that in less severe exercises (S. Moncada, A. Higgs, R. Furchgott Xiv, 1997).

Radak and et al have expressed that it can be a damage in muscle depending on the increase in NO_x production in musculoskeletal during eccentric spasms. (H. Kurtuluş, S. Eskiocak, F. Tütüncüler, U.N. Başaran, Ş. Gülen, 2003). Cuzzolin and et al have done a study on 6 active and 6 inactive subjects and they emphasizes that acute exercises can cause the production of NOx (Z. Radak, S. Pucsok, T. Mecseki, P. Ferdinandy, 1999).

Jungersten and et al have found that, after a jogging exercises that have done by healthy groups who have different physical fitness levels (exercise capacity) during 2 hours, the plasma nitrate level of repose is very high in comparison with endurance athletes and sedentaries (L. Jungersten, A. Ambring, B. Wall, A. Wennmalm, 1999).

MaedaS and et al, have reported that there is an increase in plasma NO level after 8 week of exercises (3 times a week, in 70% max VO_2), a decrease in vasoconstrictor endothelin- 1 (ET-1) level and this situation continues after the exercises during 4 weeks (S. Maeda, T. Miyauchi, T. Kakiyama, J. Sugawara, et. all, 2001).

In the studies of Banfi and et al they have worked with 15 students from medical faculty and 44 elite football players as a sedentary control and NO values: aprx. 23,2 μM for KG; 58,0 μM for FG (G. Banfi, A. Malavazos, E. Iorio, Dolci A., Doneda L., Verna R., Corsi M., 2006).

Redegran G and Saltin B's works (G. Radegran, B. Saltin, 1960) show that NO value effect on basal vasculer tone and femoral arteria blood flood by %50-60 in addition to this after period of extreme can be helpful by %35.

In the study of Taş and partners; they have announced that there is a fall in nitric acid level after speed exercises during 4 week (3 day a week, 60 minute a day) (M. Taş, F. Kiyici, F.N. Kishali, 2008).

As a result, doing regular exercise bring the production of NO to more powerful levels and relieve cardiovascular system. Just after the maximal exercises that fatigue body, NO defense can be reduced. But although the fall of NO levels an increase in break period can be supposed.

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THE OCCURRENCE OF MUSCLE DAMAGE IN MALE SOCCER PLAYERS

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ABSTRACT

The purpose of this study is to determine the occurrence of muscle damage in male footballers during the game.

A total of 13 amateur soccer players with an average age of 25.23 $\pm$ 5.36 years were participated in to this study..

Six times blood samples were taken from the participants as before the match at rest , at half time, at the end of the match and at 24, 48 and 72 hours after the match in order to determine the CK, CK-MB, CK-MM and Myoglobine values .

It was observed that the pre match CK-MB and CK-MM values were significantly lower than those observed for half time, end of the mach , just 24, 48 and 72 hours after the match which indicate the muscle damage of the players during the match ($p<0.05$). The myoglobine , CK, CK-MB and CK-MM values showed a significant increase in half time and after the match ($p<0.05$) and myoglobine level assumed the resting values 24 after the match. However the CK, CK-MB and CK-MM did not to assume their normal values even after 72 hours after the match and the difference between these respective values was statistically significant.

As conclusion; significant amount of muscle damage was observed in soccer players during the match.

Keywords: Muscle Damage, Soccer, Creatine Kinaze.

Introduction

The number of studies related to the muscle damage caused by exercise at different intensities has shown a rapid increase in recent years. They are mainly focused on the determination of the damage caused on skeleton muscles**.** (P.M. Clarkson, M.J. Hubal, 2002, D.J. Newham, D.A. Jones, 1986, K, Nosaka P.M. Clarkson, 1997, H.K. Vincent, K.R. Vincent, 1997, J.B. Shumate, M.H. Broke, J.E. Carroll, J.E. Davis, 1979, C.M, Schneider C.A. Dennehy, S.J Rodearmael, J.R Hayvard, 1995).

Muscle damage is an acute situation which cause exhaustion, loss of functionality, loss of strength and pain in muscles as a result of unaccustomed and intensive exercise (P.M. Clarkson, M.J. Hubal, 2002). Although skeleton muscle damage is related to the intensity and volume of training it is much more apparent after unaccustomed exercise.

Damage in skeleton muscles results in the diffusion of the muscles specific components from the membrane to the blood circulation system. The components used in the determination of the skeleton and heart muscle damage are mainly Creatine Kinase (CK) and its sub isoforms (CK-MB, CK-MM), myoglobine, aspartate aminotransferase (AST), laktate dehiyrogenase (LDH), brain natriuretic peptide (BNP), atrial natriuretic peptide (ANP), carbonic anhydrase, troponine and muscle constrictive proteins . Among these components the most important and the widely used one is CK. CK is the enzyme which renews ATP consumed in the contraction and transport cycles of muscles. CK becomes physiologically active in muscle cells. ATP is formed from creatine phosphate in