Effect of "Valetek-SP Aktiv" Vitamin and Mineral Food Supplement on the State of Pro- and Antioxidant Balance of Yakutia Athletes

Konstantinova L.I., Mironova G.E., Okhlopkova E.D., Efremova A.V.

ABSTRACT

The state of lipid peroxidation (LPO) and antioxidant system (AOS) in athletes – freestyle wrestlers of Yakutia before and after taking vitamin drink "Valetek-SP Active". We examined 39 wrestlers, aged 21 to 29 years. Athletes were divided into two groups: who drank and not drank a drink. Analysis of survey findings showed that after 20 days of taking a drink in the first group of athletes, TBA-RP concentration decreased by 24%. The total content low molecular antioxidants in both groups of athletes increased, but the increase in the first group was more pronounced than in the second group, 50% ($p < 0,0001$) and 22% respectively. CAT activity in the first group of athletes decreased by 15% ($p < 0,001$), while the second group decreased three-fold compared with the first group accounting for 51% ($p < 0,001$). The intensity of the enzyme superoxide dismutase for the whole period of ingestion of drink remained at the same level.

Thus, it was found that vitamin and mineral complex "Valetek-SP Active" reduces the intensity of lipid peroxidation and has a supportive effect of antioxidant protection of athletes.

Keywords: lipid peroxidation, antioxidant system, pro-and antioxidant balance, wrestlers.

INTRODUCTION

At the moment, the possibility of correction of free-radical processes in the athletes organism antioxidant preparations attracts an increasing number of researchers.

The organism of sportsmen, training in the North, is subject to long-term influence of the severe climatic and ecological factors: cold temperatures, hypoxia, causing the accumulation of reactive oxygen species (ROS) and lipid peroxidation (LPO) [2,4,6,9]. In the few publications shows that LPO play a big role in the development of fatigue and reduced physical performance [3].

However, as the analysis of published data, the state of the pro-and antioxidant balance in freestyle wrestlers' organism training in the Republic of Sakha (Yakutia), has been little studied [5].

The purpose of research was to evaluate the state of the pro- and antioxidant balance in athletes – freestyle wrestlers of Yakutia before and after drank vitamin and mineral complex "Valetek-SP Active".

MATERIAL AND METHODS

We examined 39 freestyle wrestlers of Institute of Physical Culture and Sports M.K. Ammosov North-Eastern Federal University and "High school sports" (Yakutsk), aged 21-24 years. Athletes were divided into two groups: 21 people daily drank vitamin-mineral complex "Valetek-SP Active", and the second – 18 people. Do not take this vitamin-mineral complex and not receiving additional sources of vitamins and minerals.

For one portion of the vitamin-mineral 10 g of the dry drink mix was dissolved in 250 ml of bottled water at room temperature. Ready to drink "Valetek-SP Active" sportsmen took 1 times a day, after the evening workout for 20 days in the presence of researchers.

Material for the study served as serum and heparinized blood taken from the cubital vein in the morning on an empty stomach in a state of relative muscular rest.

Lipid peroxidation was evaluated in erythrocyte suspended matter by education trimetin complex of thiobarbituric acid TBA-RP [10].

Parameters of antioxidant defense system was determined by the total content of low molecular weight antioxidants (LMAO) [7], the activity of enzymes superoxide dismutase (SOD) [8], catalase (CAT) [1].

Research LPO and antioxidant protection (AOP) were performed spectrophotometric methods on a spectrophotometer «Specord 40".

Statistical processing was performed using the software package SPSS 19.0. For quantitative indicators were calculated the mean and standard error, denoted as M±m. Estimation of the importance differences of average in the comparison groups performed using the Mann-Whitney. For all the criteria used for the threshold level of significance accepted value of $p < 0,05$.

The study was approved by the decision of the local ethics committee at "Yakutian Scientific Center of complex medical problems" SB RAMS.

RESULTS AND DISCUSSION

Table 1 shows the status of lipid peroxidation (LPO) and antioxidant system (AOS) in athletes organism before and after taking vitamin drink "Valetek-SP Active".

Comparative analysis of the data showed that in the first day of the study the concentration of TBA-RP, reflecting the intensity of lipid peroxidation (Fig. 1), and the content of low molecular weight antioxidants and super super oxide mutase activity, characterizing the state of non-enzymatic and enzymatic level of antioxidant defense, in both groups of athletes did not differ statistically significantly. Differences were detected in the antioxidant enzyme activity – catalase activity, which, in the first group of athletes was increased by 27% ($p < 0,001$) compared with athletes second group (Table 1).

On the tenth day of the study was noted no statistically significant increase of TBA-RP concentration in the first group of athletes at 8%, in the second group of athletes changes in the concentration of TBA-RP was observed, compared with the first day of the study (Fig. 1). The total content LMAO at this stage of the study in both groups of athletes increased, but in the first group, this increase was manifested most brightly (44%) ($p < 0,001$) than in the second group (6%).

Changes in the activity of antioxidant defense enzymes have the same dynamics. CAT activity on the 10th day of the study in both groups decreased in the first group of athletes by 11% ($p < 0,05$), the second – by 8%, while SOD activity did not change compared with the initial day of the study (Table 1).

On the twentieth day of the study in the first group of athletes who took vitamin drink "Valetek-SP Active" TBA-RP concentration decreased by 24%, indicating a decrease in lipid peroxidation is an indicator of adaptation of organism to the intensive psycho-physiological loads during training gathering in this group. In the second group of athletes who did not take vitamin drink "Valetek-SP Active", for 20 days, the concentration of TBA-RP increased by 20% compared to the first day of the study, indicating that the voltage adaptation processes during training gathering.

The total content of LMAO in both groups of athletes continued to increase, but an increase in the first group was more pronounced than in the second group, 50% ($p < 0,0001$) and 22% respectively. Increased LMAO in both groups of athletes, probably due to the fact that in the organism is synthesized daily LMAO (glutathione, uric acid, urea, succinic acid, etc.), which the organism uses for its own needs. For stress and increasing psychophysiological loadings the need for these substances increases, there is tension in the chain of metabolic flow rate increases antioxidants, there is a deficiency that accompanies fatigue, and reduces working capacity. A significant increase in the total content LMAO in the organism of first group of athletes, is a good indication of an improvement the state of non-enzymatic antioxidant defense and shows the effectiveness of receiving vitamin drink "Valetek-SP Active" for twenty days.

At the end of the study there was a reduction of CAT activity in both groups. However, compared with the first day of the study, the athletes in the first group showed a decrease of activity by 15% ($p < 0,001$), while the second group – CAT activity three times lower compared with the first group accounting for 51% ($p < 0,001$). Consequently, taking vitamin and mineral complex "Valetek-SP Active" has supporting action of antioxidant protection.

The intensity of the enzyme superoxide dismutase for the whole period of ingestion of drink remained at the same level.

To determine the status of pro- and antioxidative balance calculated the coefficient C_{AOD} / LPO by the formula:

KAOD / POL = LMAO + CAT / TAC-RP

At baseline the coefficient of pro- and antioxidant balance in the first group of athletes was 15% higher than in the second group (Fig. 2), this can be explained statistically significant difference in the activity of CAT, which in the first group was higher (Table 1).

On the tenth day of the study there was a decrease KAOD / LPO in the first group of athletes at 10%, and the second – by 6%. On the twentieth day of taking a drink was marked activation of antioxidant protection. Which was reflected in the first group was up 20% KAOD / LPO compared with the first day and 36%, compared to the tenth day of the study. In the second group there was the reverse reaction of KAOD / LPO values, reflected in a sharp decline on 50 and 53%, respectively, due to reduced antioxidant protection of non-enzymatic and enzymatic chain.

Thus, vitamin and mineral complex "Valetek-SP Active" has an antioxidant effect. 20-day intake of vitamin and mineral complex "Valetek-SP Active" inhibits the activation of lipid peroxidation products and increases antioxidant protection of athletes, which gives grounds to recommend the use of this complex dietary supplement as a means of effective antioxidant support of athletes' organism.

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Table 1

Indicators of antioxidant defense athletes

	Group 1 (drank a drink) (n = 21)			Group 2 (did not take a drank) (n = 18)		
	1st day	10th day	20th day	1st day	10th day	20th day
LMAO, mg eq / ml Eritrea.	0,065 ± 0,00	0,098 ± 0,00**	0,130 ± 0,01***	0,068 ± 0,00	0,072 ± 0,00	0,087 ± 0,00
SOD, umol / min. ml	0,061 ± 0,00	0,060 1± 0,05	0,061 ± 0,00	0,061 ± 0,01	0,062 ± 0,00	0,061 ± 0,00
CAT	0,700 ± 0,03^{++}	0,625 ± 0,05*	0,592 ± 0,05**$^{++}$	0,509 ± 0,05	0,467 ± 0,04	0,251 ± 0,03

*p<0,5; **p<0,001; ***p<0,0001 in the first group in comparison with the first day of study; +p<0,5; ++p<0,001; +++p<0,0001 in comparison with the second group.

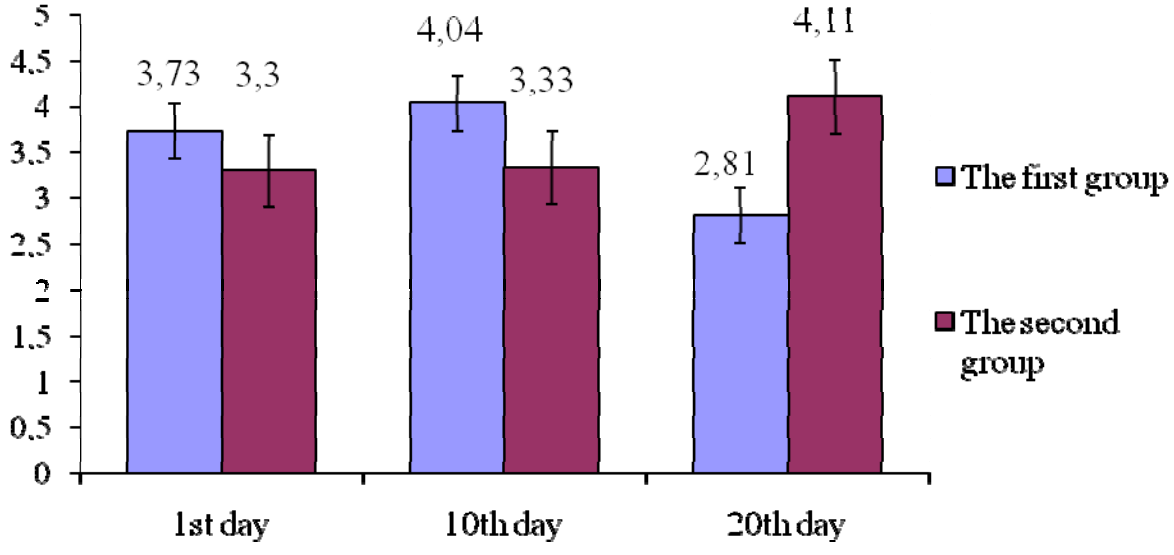

Fig. 1. TBA-RP concentration (nmol / L) in athletes who drank and not drank a vitamin drink "Valetek-SP Active", within 20 days.

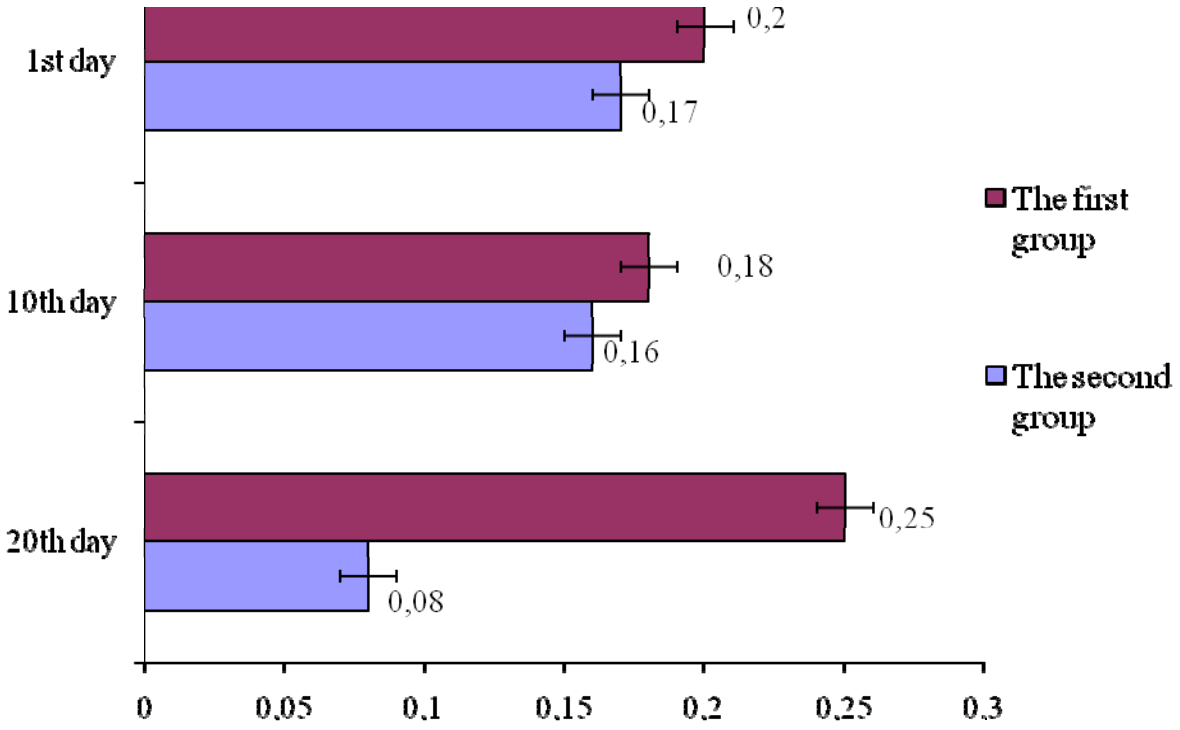

Fig. 2. Level indicator antioxidant balance before and after vitamin drink "Valetek-SP Active"

Information about authors

Konstantinova Lena I. – junior researcher, YSC CMP SB RAMS, Yakutsk, Republic Sakha (Yakutia), konstanta.l@mail.ru;

Mironova Galina E. – MD, PhD (Biology), prof., M.K. Ammosov North-Eastern Federal University, YSC CMP SB RAMS, Yakutsk, Republic Sakha (Yakutia), mirogalin@mail.ru;

Okhlopkova Elena D. – PhD (Biology), junior researcher, YSC CMP SB RAMS, Yakutsk, Republic Sakha (Yakutia), elena_ohlopkova@mail.ru;

Efremova Agrafena V. – PhD (Biology), junior researcher, YSC CMP SB RAMS, Yakutsk, Republic Sakha (Yakutia), a.efremova01@mail.ru.