QUALITY IN SPORT 1 (5) 2019, s. 15-18, e-ISSN 2450-3118
Received 12.05.2019, Accepted 25.07.2019
DOI: http://dx.doi.org/10.12775/QS.2019.002
PBN: https://pbn.nauka.gov.pl/sedno-webapp/works/907012

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Influence of the antioxidant complex on the physical efficiency of highly qualified athletes specializing in rowing

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Abstract

The publication discusses the possibility of using antioxidants to mitigate the effects of oxidative stress and increase physical performance in highly qualified athletes who specialize in rowing.

Keywords: antioxidant, oxidative stress, physical efficiency, rowing

As you know, skeletal muscles have the unique ability to significantly increase the oxygen intake in its reducing, which leads to intensification of freely radical oxidation, initiation of the processes of adaptation and reparation, or, under certain conditions, even to the development of dysptosis and functional deficits [1, 2, 5]. The problem of antioxidant protection of the body of athletes, especially highly skilled, despite the considerable number of publications on these aspects of pharmacological support of sports training, continues to remain extremely relevant. Despite the large data array, unity in the expediency and justification of the use of antioxidants during the training process of qualified athletes is not present.

Our analysis and synthesis of modern literature sources provided the opportunity to form a position on the fact that the researchers have left many aspects of influencing mechanisms on the results of training activities of athletes of various ergogenic antioxidant remedies of pharmacological origin, in particular drugs Triovirus and Vita-melatonin with complex effect on the body.

In the study attended by 20 athletes of high qualification, specializing in academic rowing. The age of the group was from 19,0 ± 0, 2 to 28,0 ± 0, 6 years, the experience of regular classes of the academic canoeing from 9.0 ± 0.5 to 18,0 ± 0.4 years.

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The study was conducted at real-time scale for 28 days in the dynamics of the specially-preparatory phase of the preparatory period. According to the method of simple randomization (stratification), the survey participants were divided into two equivalent in number (10 persons) of the group: primary and control. The participants of the main group in the dynamics of the training process under the supervision of a sports doctor received a complex of antioxidant means Triovat (KRKA, Slovenia, registration certificate of PR no 011595/01-271010) and Vita-Melatonin (JSC "Kyiv vitamin Plant "; No UA/7898/01/01 21.11.2017. Order No 1470 21.11.2017). Each capsule of the drug Triovirus contains 10 mg β-carotene (provitamin a), 40 mg tocopherol (vitamin E), 100 mg ascorbic acid (vitamin C) and 50 mcg of selenium in combination with yeast. Athletes of this complex vitamin-A detergent antioxidant, due to the metabolic nature of its action, administered two capsules three times a day for 30 days. The drug Vita-melatonin, each pill which contains 3 mg melatonin synthetic analogue neuropepper pineal body (epiphya), athletes used 6 mg once a day for 30 minutes to sleep for 30 days, which is recommended Daily and coursework therapeutic dosage. Other ergogenic pharmacological agents were not prescribed to the athletes.

For comparison, the investigated of oxidative homeostasis was also analyzed in 10 healthy non-trained individuals (students of higher education institutions) with a similar gender-age distribution.

For biochemical researches on changes of oxidative homeostasis to the beginning and after the selected period of training in athletes of both groups in the morning after the day of rest on an empty stomach received venous blood in the amount of 5 ml. The estimation of indices of oxidative homeostasis on the membrane level was performed, defining the change of prooxidant-antioxidant equilibrium by means of spectrophotometry according to changes in the activity of lipid peroxidation and antioxidant degree protection.

Assessment of physical disability was carried out by testing the motor abilities at the beginning and at the end of the study. All tests according to physical abilities were divided into ten groups:

1. Speed capacity: Big East at 30m distance (the result of measurement was time in seconds spent on overcoming the running distance); Relay test (distance in cm from the bottom edge of the ruler).
2. Power abilities: Stane Dynamometry (Applied force in kg); Abalakova Test (difference between two marks when jumping up); The rise of the torso in the SID for 30 seconds (number of lifts).
3. Anaerobic Endurance: 30-second anaerobic Vingate test Vant30 test on the Velergometer (power work in watts).
4. Aerobic Endurance: A 12-minute, running-out Cooper test (overcome distance in m).
5. Speed Endurance: Shuttle running 4 × 30 m (Time in SEC spent on overcoming the running distance).
6. Static power Endurance: The twisted arm (retention time of the position in sec), keeping the legs in a supine position (the retention time of the position in sec); Firing one foot forward, hands on the waist (retention time position in sec).

7. Dynamic Power Endurance: bending-unbending of hands in a contrite (push-ups) (number of push-ups), lifting of legs in a whirlwind on a crossbar Vystrifying up from the position of deep squats, hands behind the head (number of dislocation).
8. General physical Capacity: The Submaximal Valunda-Shestranda test PWC170 on a rowing ergometer (work in kgm × min-1).
9. Hypoxia resistance: a test with delayed breathing on exhalation (gene test) with spirometry (time of breathing delay in sec).
10. A threshold of anaerobic exchange (PANO): A Conconi test on a rowing ergometer (time of passage of a distance in sec and Heart Rate in times × min-1).

Each of the 17 tests of the assessed motor abilities was conducted twice; As the final result from the values that you received, you selected average.

At the time of statistical analysis of the indicator prooxidant-antioxidant equilibrium was established high correlation dependence: in control R1 = 0,74, and in highly skilled athletes specializing in academic rowing, R2 = 0,77 ($P < 0.05$ in both cases). Thus, the results of our research indirectly indicate the improvement of adaptive opportunities of representatives of cyclic sports under the influence of antioxidants. It can be assumed that the positive effect of the use of antioxidants in athletes is largely based on the braking of the process of peroxide oxidation of lipids and the growth of antioxidant protection in cell membranes with subsequent normalization Functional state of cell membranes and the progress of those processes that are membranoassotiation.

Indicators of physical work achieved in the state of the experiment corresponded to the regulatory criteria registered in qualified athletes and reliably did not differ between the control and the main group. In the forming experiment after course application of the complex of investigated antioxidant drugs, there was established the efficiency increase in tests and correspondingly increase of physical efficiency in the main group, in the absence of probable changes in the control group. In the athletes of the main group there was a increase of work capacity by 70.6% of the baseline ($P < 0.05$), when the athletes of the control group at the same time only 12.4% ($P > 0.05$). Correlation coefficient (r) between results Testing in control and primary groups at the end of the study next. Running from course to 30 m: R = 0.0296; Relay Test: R = 0.0508; Estate Dynamometry: r = 0.0213; Abalakova Test: R = 0.0471; Body rises in Sid during 30 C: R = 0.0302; 30 second wingetic anaerobic test of Vant30: R = 0.0345; Shuttle running 4 × 30m: R = 0.0379; 12 Minute cooper Test: R = 0.0151); Twisted Arms: R = 0.0179; Keeping the legs in a supine position: R = 0.0567; Firing one foot forward, hands on the waist: R = 0.0378; Bending-unbending of hands in the unlying (spin): R = 0.0298; Lifting of feet in a meadow on the cross: R = 0.0138; Vystrification up from the position of a deep seat, hands by head: R = 0.0246; Submaximal Valunde-Shestrada test PWC170: r = 0.0556; Test with delayed breathing on exhalation (Gene test): R = 0.0364; The Conconi test: R = 0.0167.

Conclusion

The results of our studies indicate that the use of antioxidants indirectly can affect the

improvement of motor qualities of athletes. The positive effects of use of complex antioxidant means Triovat and Vita-Melatonin give grounds to recommend them to use in sports training of athletes specializing in academic rowing.

References

1. Gil'mutdinova M.Sh., Cebrzhinskij O.I. Prooksidantno-antioksidantnyj gomeostaz skeletnyh myshc krys v uslovijah prinuditel'nyh fizicheskih nagruzok. [Prooxidant-antioxidant homeostasis of skeletal muscles of rats in conditions of forced physical exertion]. Fundamental'nye issledovanija. 2014; 5-5: 1012-1015. In Russian.
2. Gunina L.M. Okislitel'nyj stress i adaptacija: metabolicheskie aspekty vlijanija fizicheskih zagruzok. [Oxidative stress and adaptation: metabolic aspects of the effects of physical activity]. Nauka v olimp. Sporte. 2013; 4: 19–25. In Russian.
3. Hunina L.M. Bioximichni mexanizmy stymulyaciyi fizychnoyi pracezdatnosti za diyi antyoksydantnyx farmakolohichnyx zasobiv. [Biochemical mechanisms of physical efficiency stimulation for the actions of antioxidant pharmacological agents]. Zhurnal klinichnoyi ta eksperyment. medycyny (JCEM). 2015; 1: 1–14. In Ukrainian.
4. Ardakanizade M. The effects of mid- and long-term endurance exercise on heart angiogenesis and oxidative stress. Iran J Basic Med Sci. 2018; 21(8): 800–805. doi: 10.22038/IJBMS.2018.27211.6814.
5. De Carvalho F.G., Galan B.S.M., Santos P. et al. Taurine: A Potential Ergogenic Aid for Preventing Muscle Damage and Protein Catabolism and Decreasing Oxidative Stress Produced by Endurance Exercise. Front. Physiol. 2017; 8: 710. doi: 10.3389/fphys.2017.00710.
6. Jówko E, Różański P, Tomczak A. Effects of a 36-h Survival Training with Sleep Deprivation on Oxidative Stress and Muscle Damage Biomarkers in Young Healthy Men. Int J Environ Res Public Health. 2018;15(10). pii: E2066. doi: 10.3390/ijerph15102066.
7. Namazi G, Jamshidi Rad S, Attar AM, Sarrafzadegan N, Sadeghi M, Naderi G, Pourfarzam M. Increased membrane lipid peroxidation and decreased Na+/K+-ATPase activity in erythrocytes of patients with stable coronary artery disease. Coron Artery Dis. 2015; 26(3): 239–244. doi: 10.1097/MCA.0000000000000196.
8. Spirlandeli AL, Deminice R, Jordao AA. Plasma malondialdehyde as biomarker of lipid peroxidation: effects of acute exercise. Int J Sports Med. 2014; 35(1): 14–18. doi: 10.1055/s-0033-1345132.