



Evaluating the Effectiveness of Vitamin Drink «Valetek -SP Aktiv" in Yakutia Freestyle Wrestlers

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The influence of vitamin and mineral complex "Valetek-SP Aktiv" on an organism of wrestlers of Yakutia was investigated. Drinking of vitamin and mineral complex within 20-days increases vitamins levels in blood serum and removes the vitamin A, E, C and B₁ deficiency in sportsman's organism and has a favorable effect on lipid metabolism.

Keywords: vitamin sufficiency, blood serum, vitamin and mineral complex "Valetek-SP Active", biochemical status, freestyle wrestlers.

RELEVANCE

In the Far North are fairly widespread states related to vitamin deficiency or insufficiency [1,3,7,9]. Among the population of Yakutia most frequently observed hypovitaminosis A, E and C, especially pronounced in winter [2,5].

The need for vitamins increases with systematic physical activities. Especially the role of vitamins increases during training and competition cycles. Lack of vitamins and minerals can cause a decrease in physical performance of athletes and to break the recovery processes. In this regard, the use of biologically active supplements in the world of sports is becoming more common. In order to increase the adaptive capacity of athletes for increasing physical activities most commonly used biologically active additives (BAA). BAA is habitual component of sports nutrition worldwide.

Aim of the study was the estimation of influence of vitamin-mineral complex "Valetek-SP Active" for supply of vitamins A, E, C and B₁ an organism wrestlers.

MATERIAL AND METHODS

The study involved 39 healthy young men native nationality, aged 18 to 24 years, professional athletes. Among them were 1 category athletes, candidates for master of sports, sports master, and master of sports of international class. All participants are wrestlers and students of the Institute of Physical Culture and Sports (IFKiS) M.K. Ammosov North-Eastern Federal University and GU "High school sports" (SVSM) Yakutsk.

Investigation Group were athletes who had taken vitamin and mineral drink "Valetek-SP Active", numbering 21 people. The control group included 18 athletes who did not receive additional sources of vitamins and minerals. Comparison groups were composed of athletes with



similar levels of physical activity and physical fitness. The study was conducted during the winter (November-December).

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 "Valetok-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.

Biochemical studies have been performed 3 times: 1st time - before start taking drink; 2nd time - 11 days and receive the third time - after the 20-day course.

Ascorbic acid (vitamin C) was determined by titration using 2.6 dinitrofenildifenolyat ; determination of retinol (vitamin A) and α - tocopherol (vitamin E) was performed by fluorimetric method analyzer bioliquids " Fluorat -02- ABLF " firm " Lumex " configured for retinol at excitation wave 335 nm and an emission wavelength of 460 nm , for α - tocopherol - with an excitation wavelength of 292 nm and an emission wavelength of 320 nm; thiamine (vitamin B1) was determined by the photometric method analyzer bioliquids " Fluorat -02- ABLF " firm " Lumex ".

Blood biochemical parameters were determined by biochemical analyzer «Labio 200" using reagents «Biocon» (Germany).

Body mass index was calculated as Kettle: $BMI = M \text{ (kg)} / H^2 \text{ (M}^2\text{)}$.

Statistical processing was performed using the software package SPSS 19.0. For quantitative indicators were calculated the mean and standard error, denoted as $M \pm m$. Estimation of the importance differences of average in the comparison groups performed using the Mann-Whitney, Kruskal-Wallis. Mann-Whitney test was used for paired comparisons independent groups and nonparametric ANOVA Kruskal-Wallis was used to compare the mean values of three or more groups. The dependent samples when measuring quantitative indices were in the same individual at different times, the comparison of mean values was performed using the non-parametric Friedman ANOVA. For all the criteria used for the threshold level of significance accepted value of $p < 0.05$.

RESULTS AND DISCUSSION

All athletes surveyed belonged to one age category, without disabilities in physical development. Table 1 shows the anthropometric data of the surveyed athletes.

Body weight of athletes who drink ranged from 56.3 to 86.7 kg. In 7 (33%) athletes overweight was observed. In the control group, body weight ranged from 50 to 80.5 kg. Excess body weight was observed in only 1 athlete.

Height athletes who drink ranged from 1.60 to 1.84 m, while the control group of athletes from 1.60 to 1.81 m (Table 1).

Evaluation of vitamin sufficiency of athletes showed that hypovitaminosis A was noted in 22% of those surveyed wrestlers. Hypovitaminosis E before start taking drink was observed in 90% of athletes who drink and 86% of the athletes in the control group. Deficiency of vitamin C and vitamin drink reception was observed in 24% of athletes to drink, and in the control group - 39%. Hypovitaminosis of vitamin B1 was detected in only 1 athlete, taking a drink of the number before the study and the control group was not observed.

Daily intake of vitamin drink athletes within 20 days contributed to increase the effective provision of the organism antioxidant vitamins A, E, C and B1 (Table 2).

According to our data, the athletes taking the drink, in 10 days the content of vitamin A levels increased by 17% and after 20 days - 30% compared from baseline (Table 2). A statistically significant difference in the concentration of vitamin A blood fighters before and after a 20 day course of treatment with vitamin drink. At the same time, in the control group, the average concentration of vitamin A in the blood remained unchanged.

Daily intake of vitamin drink "Valetek-SP Active" significantly increased levels of vitamin E in the blood of athletes both on the 10th and on the 20th day of the study, compared with the initial level: on 10 days - 33%, and 20 days after receiving - by 52% ($p \leq 0.05$). These changes in the average concentration of vitamin E are statistically significant. It should be noted that the results of the initial assessment of 90% of athletes who drink are deficient in vitamin E. As a result, the 10-day receiving vitamin drink hypovitaminosis E was reduced to 42% and by the end of the study vitamin E deficiency was observed in only 38% of the wrestlers. In the control group of athletes levels of vitamin E did not change.

The initial level of vitamin C content in both study groups was normal. At the same time, before you start taking vitamin drink, vitamin C has been installed in 24% of athletes to drink, and in the control group hypovitaminosis C was observed in 39% of the wrestlers. On the 10th day of the drug average ascorbic acid content in the blood athletes who drink increased by 33% and by the end of the 20-day course of treatment with vitamin drink - 57%, compared with the

initial level. In the control group noted minor variations in average concentration of vitamin C in the blood.

The following vitamin average which rose as a result of a 20-day course of treatment with vitamin-mineral complex "Valetek-SP Active" is B1. By the end of the 20 day course of administration of the drug concentration in blood of vitamin B1 athletes who drink increased by 20% compared with the initial level. At the same time, the average concentration of vitamin B1 in the control group blood fighters virtually unchanged (Table 2).

Thus, the course of a vitamin drink "Valetek-SP Active" significantly increases the levels of vitamins in the blood of athletes. By the end of the course taking the drug in athletes who drink original hypovitaminosis vitamin E preserved in only 38% of the wrestlers. The concentration of the other investigated vitamins increased to normal values. In the control group insufficient supply of vitamins remained.

Cause of sub-optimal provision of athletes vitamins can be first - insufficient supply them with food, and secondly - increased utilization rate during intense physical exertion in the North, third - lack of pharmacological correction of hypovitaminosis.

One of the approaches to improve the vitamin status of athletes is consistently included in their diet enriched with vitamins food or dietary supplement. An important problem in the use of such products is correct, evidence-based selection [4,6,8].

Used by us vitamin-mineral complex "Valetek-SP Active" is designed specifically for athletes. Components included in the said drink have a tonic, immunomodulatory effects, neutralize free radicals, prevent muscle spasms, muscle contraction and provide nerve conduction, and contribute to the rapid replenishment of energy conservation status, reinforce the processes of oxidation, reduced salivation. This vitamin complex is recommended as increasing performance and endurance, loss of energy and replenish vitamins, recovery of water-salt balance and strengthen the immune system.

The following is a vitamin and mineral composition of the instant natural beverage "Valetek-SP Active", containing a fairly complete set of vitamins and minerals in doses up about 80% of the physiological needs of athletes.

We conducted a 20-day course of vitamin and mineral complex "Valetek-SP Active" a positive effect on vitamin status of athletes. The data presented in Table 2 indicate the statistical significance of mean values of vitamins in the body athletes taking supplements, only between the 1st and 3rd blood sampling. At the same time, significant differences there are between the two groups in the mean values of ascorbic acid and tocopherol.

The dispersion analysis showed a statistically significant increase in the concentration of vitamins A, E, C and B1 in the blood serum under the influence of dietary supplements athletes already on the 11th day admission ($\chi^2 = 0,000^*$). In addition, the Mann-Whitney test shows a significant difference between the two groups by the end of observation (A - 0,049*, E - 0,004*, C - 0,000*, B1 - 0,047*).

Biochemical parameters of studied athletes' blood serum are presented in Table 4.

Our data on the biochemical parameters revealed that the initial average level of lactate dehydrogenase (LDH) is higher than normal values in athletes who drink 2,08 times, while in the control group - 1,87 times. By the end of the observation LDH decreased in both groups compared with baseline values. Increased activity of LDH in the blood serum of athletes, probably due to a high rate of utilization of oxygen and hypoxia in the working muscles, as high demand muscle energy substrates under conditions of oxygen deficiency is met by anaerobic oxidation of glucose.

The average concentration of creatine kinase (CK NAC) in the first day of the study in both groups exceeded the norm: in athletes who drink - 1,75 times in the control group - 2,16 times. 10 days after receiving a drink in athletes who drink higher than normal level of 1,32 times, while the control group was within normal limits. At the end of the study, athletes who drink average 1,61 times higher than the normal value, and in the control group - 1,41 times. In athletes who drink an average level of CK MB insignificantly exceeded the normal value in the first day at 1,16 times, whereas in the control group - 1,52 times ($p < 0,05$), and end of the study in a group of athletes taking a drink - 1,08 times, while in the control group - 1,16 times higher than the normal value.

Alkaline phosphatase (ALP) activity in athletes who drink before you start taking the drink was somewhat higher than normal values. After 10 days, the average level of ALP was observed on the upper limit of normal, and after 20 days of receiving the beverage increased by 10% compared to baseline. In the control group the mean values of ALP activity throughout the study were much higher than the norm and values were higher than in athletes taking a drink. A statistical significance is observed after the 2nd blood sampling in both groups.

After a 10-day ingestion of drink "Valetek-SP Active", we noted a tendency to reduce serum triglycerides athletes who drink 23%, and 20 days after ingestion of drink triglyceride levels returned to baseline. In the control group of athletes observed same regularity. Some reduction in triglyceride levels after 10 days receiving vitamin drink, probably due to the mode

of training. At this time, the athletes competed, which leads to large energy costs and enhances lipid catabolism.

After 20-day ingestion of drink occurred lowering aspartate (AST) ($p < 0,05$), which is a very good result. As is known, increased AST in the blood is indicative of an inadequate exercise and development of fatigue. Decrease in AST activity was observed in both groups.

The results of biochemical studies suggest that have not shown significant differences between athletes who drink and the control group.

The average value of total cholesterol throughout the study in both groups varied within limits. Meanwhile, we have seen a trend towards lower cholesterol levels after 20 days of receiving the drink "Valetok-SP-Active" in the group of athletes to drink.

When analyzing the lipid metabolism have been identified wrestlers atherogenicity low coefficient (Ka) of the athletes who drink after a 20-day receiving vitamin drink, caused an increase in HDL cholesterol compared to baseline values. Whereas in the control group atherogenic factor in each study increased and HDL cholesterol dropped. LDL cholesterol and VLDL in both groups was within the normal range, but a group of athletes who took vitamin drink, there is a tendency to decrease.

Discussing the findings of biochemical studies, it is necessary to note the same pattern of changes in enzyme activity in both groups. However, the marked reduction of Ka , due to increase HDL cholesterol indicates the beneficial effect of vitamin drink for athletes' body.

Improvement of lipid metabolism, while reducing transaminase activity and increase the concentration of vitamins A, E and C, shows that vitamin drink "Valetok-SP Active" has hepatoprotective effect, increases the redox potential of the body by increasing the level of low molecular weight antioxidant system.

The fact that after a 20-day course of vitamin prevention, the part of the athletes remained hypovitaminosis E, probably related to the short-term course or receiving a relatively low dose of vitamin E in this preparation. It is known that low doses in all cases can eliminate hypovitaminosis in the short term, especially when the initial failure of a vitamin. Probably for sportsmen training in the North require higher doses of vitamin E, has a membrane and antioxidant properties.

Thus, the inclusion in the diet of freestyle wrestlers vitamin drink containing about 80% of the recommended daily intake of vitamins associated with a significant improvement in security of athletes' vitamins A, E, C, B1, and improves lipid metabolism. Results of the study show the

effectiveness of the use of vitamin drink "Valetok-SP Active" in the practice of wrestling as an additional source of vitamins and minerals for the wrestlers' organism.

CONCLUSIONS

1. The 20-days reception of drink "Valetok-SP Active" improves the security of athletes' vitamins. So, after 20 days of receiving the beverage content of vitamin A (before receiving - $46,25 \pm 2,52$ mg/dL after administration - $66,30 \pm 3,34$ g/dl) and vitamin B1 (to reception - $6,56 \pm 0,18$ ng/ml after administration - $8,24 \pm 0,22$ ng/ml) in serum athletes increased by 20%, vitamin C (until receiving $1,01 \pm 0,09$ mg/dL after administration of $1 \pm 0,06$ 76 mg/dL) - 43% of vitamin E (prior to receiving $0,52 \pm 0,06$ mg/dL after administration - $1,08 \pm 0,11$ mg/dL) - 52%.

2. 20-day course of vitamin and mineral drink "Valetok-SP Active" has a favorable effect on lipid metabolism of freestyle wrestlers: a significant decrease in total cholesterol levels ($U=0,036^*$ after a 10-day course), increased cholesterol HDL ($U=0,046^*$ after 10 days of treatment; $U=0,047^*$ after 20 days of treatment).

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Table 1

Anthropometric characteristics of the study athletes

	Age, years	Height, m	body weight, kg	BMI
	M±m	M±m	M±m	M±m
Athletes who had taken a drink n=21	21,29±0,97	1,69±0,01	69,14±2,18	24,06±0,66
Control group n=18	19,89±0,37	1,70±0,01	66,26±1,90	22,85±0,44

Table 2

Dynamics of average concentrations of vitamins in the body of athletes depending on the of duration of reception of vitamin drink "Valetok-SP Active"

	Athletes who had taken a drink (n = 21)			Control group (n = 18)		
	M±m			M±m		
	First study day	11th day of exploring	the 21st day of the study	First study day	11th day of exploring	the 21st day of the study
Vitamin A, 30-80 ug/dl	46,25±2,52	55,71±2,39	66,30±3,34*	48,10±2,99	50,23±3,19	51,30±3,51
Vitamin E, 0,8-1,5 mg/dl	0,52±0,06	0,78±0,11	1,08±0,11* ^x	0,55±0,03	0,56±0,03	0,57±0,03
Vitamin C, 0,7-1,5 mg/dl	1,01±0,09	1,51±0,07	1,76±0,06* ^x	1,01±0,12	1,02±0,17	1,04±0,20
Vitamin B1, 5-20 ng/ml	6,56±0,18	7,23±0,14	8,24±0,22*	7,26±0,41	7,39±0,26	7,44±0,41

Note: *) p < 0,05 compared with the value of the 1st day of the study; x) p < 0,05 compared with control group

Table 3

The content of vitamins and minerals in one serving of beverage

Composition	Contents in 1 portion
A	0,39 mg
E	7,5 mg
D3	5,35 mcg
C	64,0 mg
B ₁	0,95 mg
B ₂	1,1 mg
B ₆	1,2 mg
B ₁₂	1,6 mcg
PP	9,65 mg
K ₁	48,5 mcg
Pantothenic acid	2,9 mg
Folic acid	0,38 mg
Biotin	16,0 mcg
Calcium	140 mg
Mg	100 mg
Amber acid	50 mg
Carbohydrates	6,7 g
Caloric content	29 kkal



Table 4

Dynamics of biochemical parameters of blood serum of athletes

	Athletes who took a drink (n=21)			Control group (n=18)		
	M±m			M±m		
	First day of the study	11th day of the study	21st day of the study	First day of the study	11th day of the study	21st day of the study
Lactate dehydrogenase (LDH), 225-450 U/L	519,86±30,64	464,69±41,09	427,24±18,13	468,11±23,12	424,78±23,72	382,50±20,59
Creatine kinase (CK NAC), <190 U/L	332,78±51,41	250,50±39,84	305,71±43,52	410,76±57,17	193,36±26,31	267,70±63,81
Creatine kinase (CK MB), <25 U/L	28,86±2,76	25,13±2,69	27,14±2,07	37,89±4,72*	27,00±3,40	29,30±2,34
Alkaline phosphatase, until 258 U/L	294,19±19,64	258,93±15,81	285,86±23,85	350,83±30,90	345,44±28,39*	319,40±34,30
Triglycerides, 0,5-1,5 mmol/l	0,85±0,10	0,69±0,06	0,85±0,14	0,75±0,07	0,60±0,07	0,74±0,07
Total cholesterol, 3,6-6,5 mmol/l	4,06±0,13	4,10±0,18	3,73±0,24	3,64±0,12	3,51±0,13	3,45±0,12
Gamma-GT, 11-50 U/L	25,05±2,02	25,54±2,33	24,81±1,93	23,22±1,19	22,30±1,54	21,10±1,55
Alanine aminotransferase (ALT), until 30 IU	19,48±1,95	19,63±2,96	18,43±1,80	17,17±2,26	13,36±1,69	12,90±1,29*
Aspartate (AST), until 40 IU	30,05±2,28	24,93±2,78	20,38±2,39*	28,44±1,94	16,45±0,96	15,20±2,03*
Glucose, 3,3-5,5 mmol/l	4,37±0,19	4,34±0,11	4,36±0,06	4,13±0,18	4,24±0,14	4,16±0,06



Urea, 2,5-8,3 mmol/l	4,64±0,27	4,96±0,32	4,80±0,20	4,51±0,23	4,46±0,34	4,72±0,30
Creatinine, 53-97 mcmol/l	92,24±1,66	94,15±2,36	94,24±1,53	90,33±2,75	93,30±2,81	95,00±3,76
Total protein, 65-85 g/l	74,70±0,68	73,57±1,05	72,91±0,81	72,12±0,72	72,64±0,93	71,70±1,07
Albumin, 34-48 g/l	45,98±0,33	44,86±0,66	44,03±0,40	44,69±0,35	40,56±4,33	44,21±0,59
HDL cholesterol, 0,78-2,2 mmol/l	1,34±0,09	1,46±0,11	1,43±0,09	1,25±0,06	1,19±0,07	1,13±0,09
LDL cholesterol, 1,68-4,53 mmol/l	2,23±0,12	2,22±0,17	2,10±0,11	2,04±0,11	2,04±0,10	1,97±0,09
VLDL, 0,8-1,5 mmol/l	0,41±0,05	0,31±0,03	0,39±0,07	0,35±0,04	0,28±0,03	0,34±0,03
Coefficient atherogenity (Ka), <3	2,11±0,18	1,98±0,18	1,89±0,14	2,02±0,19	2,01±0,16	2,14±0,23

Note: *) The level of significance of differences $p < 0,05$ as compared with baseline content