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CORRECTION OF NUTRITION OF PROFESSIONAL ATHLETES ACCORDING TO PROTEIN AND VITAMIN METABOLISM INDICATORS

Turakulova Durdona Shukhrat kizi
Samarkand State Medical University,
4th year student of the Faculty of Pediatrics.

Payzullayeva Vazira Furkatovna
Siyob College of Public Health
named after Abu Ali ibn Sino teacher

Abstract: This study evaluated the effectiveness of dietary correction in professional athletes based on indicators of protein and vitamin metabolism under physical stress. Changes in metabolic indicators (urinary total nitrogen, urea, ammonia, and Waterloo index) were analyzed among athletes in three groups with different dietary regimes. The results showed that the addition of dietary supplements and mineral water to the diet positively influenced protein metabolism.
Keywords: athletes, protein metabolism, vitamin C, urinary nitrogen, dietary correction, dietary supplements (DS), Waterloo index.

Modern sport is characterized by intense physical exertion during training and competitions, increased nervous and mental stress, and a focus on record-breaking sports results. One of the most important conditions for sporting success in professional sports, along with the correct organization of training and daily routine, is proper nutrition, since nutrition is one of the most important factors determining the physical and mental state and health of a person. Nutrition supports high performance and protects the body from the negative effects of the environment [4,6].

Introduction: An analysis of scientific publications on the study of energy expenditure and metabolic processes in the body of athletes in Uzbekistan shows that this problem has not been given sufficient attention by researchers and medical workers. In this regard, there is a need to develop nutritional standards for professional athletes of Uzbekistan that correspond to the real needs of the athletes' body in essential nutrients, taking into account national nutritional characteristics, age and gender groups, types of sports, professional skills and hot climatic conditions.

Materials and methods. The study was conducted on professional martial arts athletes during training at a sports facility. The athletes' round-the-clock stay at the training and health-improving facility and the relatively equal level of their energy expenditure made it possible to obtain objective data on the athletes' metabolic state against the background of different diets.

The martial arts athletes included in the study were divided into 3 groups according to their nutrition:

Group 1 - athletes with a real diet;

Group 2 - athletes receiving a modified diet without the addition of BFQ (biologically active additives) and mineralized water; The change in the diet consisted in the inclusion of products such as meat, fish, legumes, milk, fruits, greens and juices.

Group 3 - athletes receiving a modified diet including BFQ "Kuvatin" (2 tablets of 0.22 g per day), "Bioferron" (2 tablespoons per day) and 2 liters of artificially mineralized "Bonaqua" water per day.

One of the main indicators of protein metabolism, reflecting the state of metabolism during dietary correction, is the study of nitrogenous components of urine: in the form of daily excretion

of ammonia, urea and the Waterloo index. Nitrogenous fractions of urine allow us to assess the nature of protein metabolism during heavy physical exertion, since the end products of metabolism are excreted mainly by the kidneys [1,2,5].

Of the vitamin complexes, vitamin C has the greatest impact on biochemical processes of metabolism [1,3]. In this regard, we have chosen indicators of vitamin C supply to the body as a biochemical criterion of the state of vitamin metabolism.

Results and discussion of the study: When evaluating the data obtained, it should be taken into account that in adults, the amount and quality of the studied protein can be estimated from the daily nitrogen content of urine. Thus, the excretion of nitrogen in the urine in mg/h in the studied athletes depended on the average daily protein content and the biological value of the diet [7,8].

The energy intensity of total proteins in the average daily diet of real nutrition corresponds to the physiological needs of athletes of both sexes in all sports. At the same time, it was found that the level of animal proteins in the total protein content is insufficient for all sports, the physiological level should be at least 55.0%, which was 51.0±1.1% for wrestlers and track and field athletes, and 53.0±1.1% for boxers and weightlifters. In the winter-spring season, against the background of real nutrition (group 1), the average daily nitrogen content in the urine of male and female wrestlers was 12.2 ± 0.1 g/day, with a protein intake of 135.4 ± 4.8 g. In the summer-autumn season, this value in men was 12.6 ± 0.1 g/day, with a protein intake of 147.3 ± 5.3 g; and in women - 11.8±0.1 and 12.1±0.1 g/day, respectively, and protein intake was 132.1±3.0 and 138.8±2.5 g.

Against the background of the modified diet, it is worth noting the increase in the protein level in the diet of group 2 subjects, martial artists: in men from 175.4±4.8 g per day to 224.5±4.0 g per day in the winter-spring season and from 177.3±5.3 g to 236.3±5.3 g per day in the summer. Accordingly, for female martial artists - from 170.1±3.0 g per day to 218.2±4.0 g per day in the cold season; from 173.8±2.5 g/day to 227.4±4.0 g/day in the hot season.

In both male and female athletes receiving a modified diet, the daily excretion of nitrogen in the urine significantly increased - up to 13.7 ± 0.2 - 14.1 ± 0.2 g / day, i.e. an increase of 10-15% compared to the actual diet, which indicates an increase in protein digestibility.

To more fully characterize the state of protein metabolism, it is necessary to study not only the total excretion of nitrogen, but also its individual fractions. Among them, urea occupies the leading place, the nitrogen of which constitutes the most significant part of the daily nitrogen in the urine.

Determination of nitrogenous fractions of urine showed that the average daily excretion of urea in men under real nutrition was 9.7±0.2 - 10.2±0.2 g, and in women 12.6±0.2 - 12.8±0.1 g, respectively, and in women 9.4±0.2 - 9.8±0.2 g/day, and in women 12.5 0.2-12.8 0.1 g/day. The increase in absolute urea excretion occurred in parallel with the increase in total urinary nitrogen excretion. This indicates a beneficial effect of the modified diet on the body of the subjects.

To assess the nature of protein metabolism and the stability of this process in the body, it is not the absolute amount of urea excreted, but the relative amount of urea nitrogen in the daily urine (%), called the Waterloo index, since a certain relationship has been established between the latter and the quality of the protein. This indicator mainly indicates the degree of protein digestibility [5].

If the Waterlooy index is 60% or less, we can talk about a violation of protein metabolism. In cases of significant protein deficiency, which can lead to a decrease in labile "protein reserves" in the diet, the urea index decreases to 40-50% and can serve as an indirect confirmation of the clinically expressed manifestation of metabolic disorders in the body. In our studies, the urea index on the basis of real nutrition was 66.7±0.4 - 67.8±0.3% in men and 66.6±0.4 - 67.1±0.3% in

women. When the diet was changed in the 2nd group of subjects, the Waterlooy index was 82.1±0.4 - 87.2±0.5% in men and 82.0±0.3 - 87.4±0.4% in women. It is evident that, despite some differences in the amount of protein consumed with food, the values of the urea index in men and women on the modified diet did not differ significantly. An increase in the Waterloo index indicates an increase in the biological value of the diet and protein digestibility due to an increase in the level of complete quality proteins.

Thus, in group 2 subjects, the increase in nitrogen excretion in the urine against the background of a modified diet was 10-15%, the increase in the Waterloo index was 18-20% compared to the background of real nutrition.

One of the nitrogen components characterizing the state of protein metabolism during heavy physical exertion is ammonia, the concentration of which in daily urine can vary depending on the biological efficiency of food. It was found that significant disturbances in protein metabolism associated with the quality of nutrition are accompanied by an increase in the percentage of ammonia nitrogen in the daily urine nitrogen content.

The conducted studies showed that the daily excretion of ammonia in the urine of athletes against the background of real nutrition: in men 795.0±7.0 - 812.0±8.0 mg, in women - 791.0±8.0-796.0±8.8 mg. Against the background of a changed diet, this indicator in the 2nd group of subjects was significantly reduced to 682.0±7.0 - 674.0±5.0 mg in men and 672.0±6.0-668.0±5.0 mg in women. The average decrease in the level of ammonia in the daily urine of the subjects was 10-15% of the ammonia level in the 2nd group of subjects with a changed diet compared to the level in the real diet. The data obtained indicate the normalization of protein metabolism in the subjects against the background of a changed diet.

The best indicators characterizing the state of protein metabolism were obtained in group 3, that is, in addition to the modified diet, "Quvatin" (2 tablets of 0.22 g per day), "Bioferron" (2 tablespoons per day) and 2 liters of artificially mineralized "Bonaqua" water per day were added. It should be noted that, compared with athletes in group 2, athletes in this group had a slight difference in the average daily protein intake, an increase in the amount of nitrogen excreted in the urine and an increase in urea by 6-8%, an increase in the Waterloo index by 7-8% and a decrease in the level of ammonia by 5-6%. This indicates an increase in the biological value of the diet with the addition of BFQ and the beneficial effect of alimentary correction on the athletes' body.

A study of the biochemical parameters of nitrogenous components of urine on qualitatively different nutritional backgrounds shows that there is a direct relationship between the biological value of food and the excretion of total nitrogen, ammonia and urea ($r = \pm 0.61$).

Given the important role of ascorbic acid in protein metabolism and its participation in redox processes, its important role in increasing the protective functions of the body, along with some indicators of protein metabolism, we studied the supply of vitamin C to the body of wrestlers against the background of real and modified nutrition. Rationalization of the athletes' diet improved the protein content of their diet and significantly increased the body's intake of vitamin C. Laboratory studies of the content of vitamin C in the daily diet of the subjects showed that in the winter-spring season its amount against the background of real nutrition was 116.2±2.0 mg/day for men and 112.4±2.0 mg for women; in the summer-autumn season - 128.4±3.0 mg for men and 122.5±2.0 mg for women, respectively. In the second group of subjects, against the background of a changed diet, the amount of vitamin C increased by an average of 25-30% and amounted to: 156.0±2.0 - 158.0±3.0 mg in men and 145.0±2.0 -151.0±2.0 in women. In group 3, the addition of "Bioferron" BFQ in a volume of 15 g per day allowed to increase the intake of vitamin C by 7.5 mg in each group of men and women.

The study of the urinary excretion of vitamin C against the background of real nutrition showed that in all cases the excretion of vitamin C in athletes was below the physiological norm (1 mg / h). The increase in the intake of vitamins in the body against the background of a modified diet allowed the urinary excretion of vitamin C in both men and women to increase by 15-18% in group 2 and by 30-35% in group 3, compared to athletes of group 1.

These data indicate not only the relationship between the amount of vitamin C entering the body of athletes and the excretion of vitamin C in mg / h, but also the direct relationship between the use of BFQ, which has a preventive effect.

CONCLUSION

The detected decrease in total nitrogen and urea excretion, the high content of ammonia in daily urine relative to total nitrogen, and the low urea index in athletes engaged in martial arts against the background of real nutrition indicate that this diet has a low biological value and does not meet the physiological needs of athletes.

1. According to the results of the study, the low excretion of total nitrogen and urea, the high content of ammonia in daily urine relative to total nitrogen, and the low urea index in martial arts athletes participating in the study against the background of real nutrition indicate that these diets have a low biological value and do not meet the physiological needs of athletes.
2. Changing the qualitative composition of the diet allowed athletes to normalize the biochemical parameters of nitrogenous components of urine and improve protein absorption. The best indicators characterizing the state of protein metabolism were obtained in group 3 subjects, that is, those who, in addition to the modified diet, received "Quvatin", "Bioferron" BFQ and 2 liters of artificially mineralized "Bonaqua" water per day.
3. Laboratory studies of vitamin C in the daily diet of the subjects showed that its actual dietary content (112-128 mg) does not provide the required level of vitamin C excretion in mg/h.
4. Normalization of vitamin C excretion in mg/h can be achieved by correcting nutrition: the addition of "Bioferron" BFQ in a volume of 15 g per day allowed both men and women to increase vitamin C intake by 7.5 mg. As a result, the excretion of vitamin C in mg/h reached normal levels (1.1-1.3 mg/h).

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