



Correction of Deficiency of Vitamins and Minerals in the Body of Military Personnel

1. **Rakhimova Dildora
Dzhurakulovna**
2. **Askarova Nilufar Kudratovna**

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ABSTRACT: A significant part of specialists in the field of rational nutrition adhere to the point of view that the usual daily diet of a modern person, which is quite sufficient to cover energy costs and elements of plastic metabolism (fats, proteins, carbohydrates), is not able to meet the physiological needs of the body in a number of vitamins and minerals [14,15].

Keywords: vitamins, minerals, deficiency, food fortification.

¹Assistant of the Department of General Hygiene and Ecology of the Samarkand State Medical Institute.

²Ph.D. Associate Professor of the Department of Public Health and Healthcare Management of the Samarkand State Medical Institute

Relevance: According to scientists, such a deficit is laid down evolutionarily, since man as a biological species was formed under conditions when the body had to process a much larger volume of rough unprocessed food to maintain its energy needs. As a result, the amount of received vitamins was more simply due to the consumed volume [29].

The diet of a modern person consists to a large extent of refined foods that are cooked [17]. As a result, the amount and range of micronutrients consumed by humans have become significantly smaller. This whole process of changing the feeding pattern took about 5 thousand years, and in its modern version - about 100 years - an insignificant period by the standards of the evolution of the species. The physiological systems of the body are not able to adapt to the changes in nutrition and evolve so quickly. To correct the vitamin and microelement status, it is currently recommended to use: - a balanced diet with a sufficient variety of traditional products; - Vitamin-enriched food products of mass consumption; - specialized (functional) food products intended for a specific category of persons; - vitamin and mineral complexes.

Providing the necessary vitamins through selected food products in the daily diet is the most physiological, minimally invasive and aesthetically acceptable [7]. Such a healthy diet provides the body with vitamins and minerals that are part of the enzyme systems or form vital complexes with certain proteins, and it prevents a number of chronic diseases of the cardiovascular and immune systems, and reduces the risk of developing cancer [11,17].

The main principles of balanced nutrition, developed in the Republic of Uzbekistan, are: compliance of the caloric content of food with the energy needs of the body; balance of the diet for the main nutrients (proteins, fats, carbohydrates); natural saturation of the diet with essential micronutrients (vitamins and minerals), variety of food, adherence to the diet, correct distribution of the diet between 4 meals.

However, it should be noted that at present, the amount of vitamins in many vegetable crops, according to averaged data, has decreased by almost 30% [4], although the content of vitamin C, as shown by studies carried out at the Institute of Nutrition of the Russian Academy of Sciences, has remained in fruit and vegetable products for the last 60-70 years at about the same level [6]. Even with a diet composed of natural products, adequate energy expenditure, subject to its balance and diversity, representatives of all age groups may have a deficiency in most vitamins, reaching a deficit of 20-30% on average in the population [8,12].

One of the approaches to improving the vitamin status of the population is the regular inclusion in the diet of vitamin-fortified food products of mass consumption or specialized (functional) food products intended for specific categories of citizens, living conditions and work [16].

In most developed countries, as well as in many developing countries in Africa, Asia and Latin America, the fortification of food with vitamins and microelements is legally regulated. The amount of vitamins added to fortified foods is regulated by government laws and government regulatory agencies.

In the USA since 1974, in Canada since 1978 mandatory fortification of all flour with vitamins B1, B2, B6, PP, A, folic acid, iron, calcium, magnesium and zinc has been carried out. In Germany, any milk intended for processing or production of baby food must be fortified with vitamin D. In Australia, Great Britain, Canada and Sweden, all margarine varieties are fortified with vitamins A and D, fruit juices and drinks with vitamin C. In our country, the task of fortification of food products of mass consumption is solved in accordance with the Order of the Government of the Republic of Uzbekistan (Decree of the President of the Republic of Uzbekistan on additional measures to ensure healthy nutrition of the population on November 10, 2020 No. PP-4887 of Appendix No. 1 "Program of measures for the formation of a lifestyle among the population healthy eating in 2020 - 2025 ") whose tasks include the prevention of diseases caused by inadequate and unbalanced nutrition.

Analysis of fortified food products actually present on the consumer market has shown that at present, for almost any food product, there is an fortified analogue containing from 20 to 40% (at least 15%) of the average daily human need for the corresponding vitamins [8, 14].

The main requirement for functional food products is the inclusion in their composition of substances that make it possible to eliminate the deficiency of essential minor components (vitamins, minerals, polyunsaturated fatty acids), which is found everywhere in the majority of the population. An effective form of prevention of diseases caused by a lack of micronutrients is the use of biologically active food additives (BAA). BAA are concentrates of natural or identical to natural biologically active substances intended for direct intake with food or for introduction into food products. The most widely used dietary supplements are based on plant components [1, 23]. Vitamin-mineral complexes are widely used as biologically active food additives.

The inclusion of biologically active additives in the food ration of military personnel is due to the peculiarities of their professional activities, associated, as a rule, with the influence of a complex of unfavorable factors that contribute to the development of de-adaptive states and require their prevention and correction [10]. In connection with equipping the Armed Forces of the Republic of Uzbekistan with new types of weapons and military equipment, the emergence of new adverse environmental impacts, extreme factors of military labor, it became necessary to improve the existing food system for servicemen, ensuring the preservation of their health [18]. The use of dietary

supplements enriched with micronutrients is advisable in order to optimize the adaptive and protective mechanisms of the body of military personnel in the field [13], in local and military conflicts [12], peacetime emergency situations, in the context of evaluating a new model of physical training [9]. Special functional food products with increased biological value (BAA) are also relevant for servicemen with insufficient body weight [19], personnel of the Armed Forces, or in extreme climatic conditions. efficiency, a balanced set of essential substances, harmlessness, acceptable cost, long (at least 2 years) shelf life, the possibility of storage in a military unit and direct use without special training. Important conditions for the choice of dietary supplements are also domestic raw materials and production, packaging that provides protection against various types of pollution [9, 22]. Expanding the range of food products included in the diet of military personnel, the use of functional food products, and primarily biologically active food supplements, is a promising direction in shaping their health, reducing the incidence of diseases, and increasing combat effectiveness. In modern conditions, when the micronutrient deficiency is of the nature of combined deficiency, manifests itself in almost all population groups and regions and does not significantly weaken in the summer, the role of correction of the vitamin-mineral status with the help of vitamin-mineral complexes (VMC), providing a balanced intake to the body, increases. components in dosages not exceeding the permissible levels of daily consumption [2]. Synthetic vitamins that are part of vitamin preparations are completely identical in their chemical structure to natural analogues that are part of food products. At the same time, synthetic analogs are not only not inferior to natural ones in the effectiveness of physiological effects on the body, but also have a number of advantages. Due to the high degree of purification and the use of modern technologies in production, they are less allergenic [21]. VMC of domestic production, presented on the market, can be conditionally divided into two groups:

1. Complexes in which vitamins and minerals are in one tablet. The compatibility of components in this form is ensured by a special technology of the VMC production.
2. Complexes, represented by several preparative forms. Of the traditional complexes in which all the ingredients are in one tablet, one can mention Complivit (Pharmstandard-Ufa VITA), Vitaspectrum (Veropharm), Bio-Max (Valenta Pharmaceuticals), Geksavit (Kiev Vitamin Plant JSC Ukraine, Kiev), etc.

Let us briefly dwell on the description of the Complivit IUD, which contains 11 vitamins and 8 minerals (B12 is present, selenium is absent). This complex compensates for the lack of essential vitamins and minerals, taking into account the nutritional characteristics, does not contain excessive doses of vitamins and minerals, therefore it is suitable for long-term preventive use.

"Geksavit" is a classic multivitamin preparation containing 6 vitamins, with more than 40 years of experience in use in the Armed Forces - an excellent example of the optimal combination of "price / quality". Nevertheless, taking into account modern knowledge about the combined action of vitamins and minerals, most experts consider this drug somewhat outdated for widespread use. The assimilation of some vitamins and minerals from "one-tablet" preparations is 30-50% lower than from complexes presented by several preparative forms. It is equally important that the loss of activity when all components are combined in one tablet is not the same for different micronutrients and is difficult to predict. Especially many antagonistic interactions have been revealed in relation to minerals, which is explained by the presence of common transport mechanisms for some of them and, accordingly, competition for assimilation [20]. The complexes, represented by several preparative forms, are developed according to the principle of combining components - the combination of only synergistic vitamins and minerals in each tablet of the complex, while the antagonists are in different tablets.

Dividing the daily dose of the elements necessary for the body into several tablets, taking them during the day, observing the time interval, avoids unwanted interactions and enhances the beneficial effects [5].

The experience of prevention of hypovitaminosis and diselementosis in civil and military health care of foreign countries is interesting for comparative study. The ideology of vitamin supply for US military personnel is rather conservative. In the US Army, it is believed that the existing food rations (diet A - daily food at the bases of permanent deployment and diet B - food in the field) almost completely meet the needs of personnel for vitamins. In conditions of warfare, some reduction in the daily intake of vitamins, for example, ascorbic acid, from 90 to 40 mg is allowed. The understanding that military activity is associated with increased physical and mental stress, nevertheless, has not yet been reflected in the practice of food and, in particular, vitamin provision of American servicemen. In 2006. The US Department of Defense has commissioned the National Academy of Sciences Institute of Medicine to study the use of food supplements by the military, incl. vitamins. Another recent study found that American military personnel themselves take vitamins and other dietary supplements, on average, 3.5 times more often than civilians. They also more often (on average, 45%) turn to representatives of complementary or alternative medicine . About 60% of military personnel regularly take biologically active food supplements (BAA) on their own, this contributes to their good mood and health. Among them are multivitamin, mineral, amino acid-protein, herbal, etc. [26]. A 2014 systematic review and meta-analysis on the use of food supplements by military personnel at the US Army Research Institute of Environmental Medicine - USARIEM (headquarters in Natick, Massachusetts, USA) showed that the use of dietary supplements in the military , in the US Navy, Air Force and Marine Corps was, on average, 55%, 60%, 60% and 61% for men, and 65%, 71%, 76% and 71% for women, respectively . It has been shown that prophylactic vitamin C intake can help prevent pneumonia, especially in those individuals whose intake of this vitamin is reduced. During World War II, vitamin C intake reduced the incidence of pneumonia by 80% . In addition, reduced levels of vitamin D in the blood may also contribute to an increase in the incidence of acute eosinophilic pneumonia in military personnel. In 2014, authors from the US Army Research Institute of Environmental Medicine (USARIEM) showed that prophylactic calcium and vitamin D supplementation helps maintain bone density (and thus reduces the risk of bone fractures) in military personnel during combat training. It is recommended to consume 1000 mg of calcium and 15 mcg of vitamin D per day, but in most of the surveyed military personnel this dose was lower . Blood levels of vitamin D should be especially carefully monitored in female military personnel in the older age group

In addition, low vitamin D intake may be associated with military suicidal tendencies. Military personnel of NATO countries, however, do not often consume functional foods. In particular, in Belgium, only 4.7% of military personnel consume dairy products fortified with probiotics, only 14% of them - one or more servings of nuts per week, only 12% - fish oil weekly. Three or more servings of fruit per day are consumed by 19% of people, and two or more servings of vegetables per day - by 26% of military personnel, 10% are consuming a glass of red wine every day. Nonetheless, functional nutrition was associated with good health. In Belgium, multivitamin supplements were more likely to be taken by military personnel with a low body mass index, nonsmokers, sportsmen and those with a higher general cultural level, more often by Flemings than by French Among women conscripted for military service in the Israeli army, there is a high frequency of iron deficiency and iron deficiency anemia - 29.8% and 12.8%, respectively. This requires additional administration of iron and vitamin B12. In their first year of service, they also often have deficiencies in the consumption of other minerals and trace elements, in particular, calcium (61%), zinc (71%) and vitamin D (34%) [31]. In the military hospitals of the US Army in the past 10 years, vitamins A, C, D, E, K have also been actively prescribed in the treatment of various diseases. The prescription of vitamin D increased (by 45.4%) and slightly decreased - vitamins A, E and K (by 32%, 53% and 29%, respectively). In general, vitamins were prescribed more frequently by 180%. British military personnel who are actively involved in sports receive various supplements in 38% of cases [28].

Conclusion: As a conclusion, it should be noted that in the armed forces of the NATO countries vitamin and mineral complexes are not included in the food supply standards; to correct the vitamin

and microelement status, military personnel use (mainly independently) vitamin-enriched food products of mass consumption and, in rare cases, specialized (functional) food products [30].

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