



## **BRIEF REVIEW OF THE RESULTS OF SCIENTIFIC RESEARCH ON VITAMIN DEFICIENCY AMONG MILITARY PERSONNEL**

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<b>Article history:</b>	<b>Abstract:</b>
<b>Received:</b> June 8 <sup>th</sup> 2025 <b>Accepted:</b> July 7 <sup>th</sup> 2025	This article presents an analysis of scientific publications devoted to the problem of assessing the vitamin status of military personnel and methods for its elimination. It was found that professional athletes experience physical and psychological stress comparable to military personnel, and the need for vitamins is constantly increasing. The method of "megadoses", especially antioxidant vitamins, is not beneficial for health and endurance, but sometimes they have a pro-oxidant effect. The analysis reflects information that the correction of the vitamin status of the body should be carried out using a balanced diet (using traditional products), including products enriched with vitamins of mass consumption in the daily diet, the use of specialized (functional) products intended for certain categories of the population (military personnel serving in extreme and difficult climatic and geographical conditions), and vitamin-mineral complexes.

**Keywords:** Soldiers, vitamins, macronutrients, microelements, polyhypovitaminoses, nutrition regulation, vitamin-mineral complexes.

**INTRODUCTION.** An important element of maintaining and strengthening the health of military personnel is ensuring their proper nutrition with macro- and micronutrients, which are components of energy and metabolism. Sufficient provision of the body with vitamins and mineral elements is especially important when performing military service in extreme labor conditions in some regions. Inadequate provision of the body with macro- and micronutrients in adverse climatic and geographical factors and special conditions of military labor can lead to a decrease in adaptive reserves, natural weakening of the body, and as a result, diseases of the respiratory system, gastrointestinal tract and other organs may occur [1, 2].

A prerequisite for assessing the adequacy of nutrition is the study of clinical signs of vitamin and mineral deficiency and laboratory tests [3].

**RESEARCH OBJECTIVE:** To study the results of scientific studies conducted to examine the status of hypovitaminosis among military personnel of foreign armed forces in order to study the vitamin status of military personnel in the Armed Forces of the Republic and subsequently improve measures to prevent hypovitaminosis.

**MATERIALS AND METHODS.** A search of the Internet databases PubMed, Google Scholar, CrossRef, and "Бесплатная статья ПМС" was carried out in October 2024 using the Google search operator. The search was conducted using the following terms: "vitamins", "hypovitaminosis", "vitamin deficiency", "plasma", "food hygiene", "laboratory diagnostics", "military personnel", "macroelements", "microelements", "polyhypovitaminoses", "nutrition correction", "vitamin-mineral complexes". The search results showed a list of scientific reports, reviews of articles, and literature related to the topic area available within the last 10 years from the time of the search. In areas where new information on the topic was not found, the search depth was expanded to another 5 years.

**ANALYSIS RESULTS AND DISCUSSIONS:** In a study conducted by Russian scientists (N.N. Kirichenko et al., 2018), the content of vitamins A, E, D, C, B1, B2, B9 and B12 in the blood serum of 156 military personnel serving in the Arctic zone of the Russian Federation in the autumn and spring seasons was studied using laboratory methods. The study involved men aged 18 to 25 years, somatically healthy, with at least four months of service since the moment of conscription. The military personnel under study were



similar in terms of physical and health indicators, lived in barracks conditions and ate the same food for a long time, and had similar conditions of service and physical activity. Among the examined military personnel, it was found that latent (subclinical) forms of vitamin deficiency A, E, D, C, B1, B2, B9 and B12 are present both in spring and summer, and in the epidemically dangerous autumn-winter period. The idea that vitamin deficiency is a traditional "spring" one was clarified, and it was found that such a condition occurs no less often in autumn than in spring, and that vitamin C and B1 deficiency is relatively more common in the spring months. It was concluded that in order to constantly provide military personnel with vitamins in the Arctic zone, it is necessary to use modern laboratory diagnostic methods to determine the subclinical diagnosis of vitamin deficiency. In order to prevent hypovitaminosis among military personnel serving in such conditions, a scheme of alternating consumption of multivitamin preparations and products enriched with vitamin C for 1 month was proposed.

Another group of Russian scientists (A.I. Andriyanov et al. 2016) presented in their article the results of an analysis of published data on the vitamin status of military personnel and its correction. According to their analysis, the results of studies conducted in the Russian Federation on the problem of hypovitaminosis are consistent with those obtained abroad. The prevalence of long-term polyhypovitaminosis has been established as a result of numerous epidemiological observations conducted in both developing and developed countries. In the United States of America (USA), it has been shown that a significant part of the adult population (from 20 to 40%) has a deficiency of vitamins such as tocopherol [4], retinol and folic acid [5]. Polyhypovitaminosis is also common in European countries - Finland, Sweden, etc. [6, 7].

D. Grimes [6] indicates that hypovitaminosis D occurs in almost half of the world's population.

In the course of studying a new model of physical training in the Armed Forces of the Russian Federation, aimed at increasing the volume and intensity of physical exercises, a phenomenon of vitamin deficiency was observed when the average daily energy expenditure of soldiers increased. Although the planned nutritional ration corresponded to the standard values of energy expenditure, the content of vitamins in the blood of servicemen was below the recommended level: ascorbic acid - 19.4%, vitamin A - 21.4%, vitamin B1 - 7.7%, vitamin B6 - 23%, vitamin RR - 7.5% [8].

Vitamin deficiency in servicemen is especially important in extreme conditions of service [9]. Studies conducted with military personnel in the high mountains of Afghanistan have shown that the body of military personnel is exposed to hypoxia, increased physical activity, sudden changes in temperature, dehydration, ultraviolet radiation, and respiratory alkalosis, especially an increased need for vitamins C, A, and B2. 60% of marines in tropical climates have signs of vitamin deficiency, despite the normal composition of vitamins in their diet. Hypovitaminosis is also found in people working with toxic substances, on submarines, and in flight crews [9].

Special requirements are imposed on the need for vitamins when compiling a food ration for military personnel of special forces, whose main service is carried out in difficult climatic and geographical conditions, working under severe physical and psychological stress. It has been established that when special forces soldiers perform tasks in mid-mountain conditions (at an altitude of 1500–2500 m above sea level), the consumption of vitamins C, B1, B2, PP should be doubled for 3–20 days, starting from the first 7–10 days of acclimatization [9].

The problem of hypovitaminosis is very relevant for soldiers serving in the Far North and the Arctic [10]. It has been established that the indicators of the vitamin and mineral status of soldiers depend on both the nutritional value and quality of drinking water. In some military camps located in the Arctic, the main source of water supply is water from melted snow, which has low mineralization, which leads to impaired absorption of vitamins and the development of dyselementosis [11, 12].

Nutritional assessment of conscripts in the North showed that their diet was close to the values of the general military ration in terms of food and energy value (with the exception of fat deficiency), however, many of them were diagnosed with polyhypovitaminosis. Thiamine deficiency was especially pronounced - 73%, retinol and tocopherol - 68-100%. Vitamin D deficiency is observed in people who spend a long time in the conditions of the polar night or work underground.

The cause of polyhypovitaminosis in the Far North is associated with the processes of adaptation and acclimatization. In this regard, the generally accepted point of view is that in the regions of the Far North, the individual need for vitamins increases by an average of 30-50% [13, 12].

To date, the importance of vitamins in maintaining physical indicators that determine the combat effectiveness of military personnel in extreme



conditions is controversial. Over the past decade, considerable experience has been accumulated in the field of studying the vitamin status of athletes and methods for its correction [14, 15]. Given the specifics of this group of physical activity, military personnel performing tasks in extreme conditions and athletes exposed to maximum physical activity, it is considered appropriate to increase research in this area [16].

The results obtained by researchers in the field of sports medicine indicate the following:

Insufficient supply of the body with vitamins significantly reduces physical performance and increases the recovery period;

with a properly balanced diet, additional vitamin intake is not always necessary;

vitamins are often used in conditions of long-term (months) and intense physical activity, in the short-term (up to 1 week) recovery period, in preparation for the next stage of the competition (direct analogy with the conditions of conducting a combat mission) [17, 18].

With an increase in physical activity from group I (mainly mental work with a daily intake of 2100-2450 kcal) to group V (especially heavy physical work with a daily intake of 3750-4200 kcal), the need for vitamins increases [19]. This applies primarily to vitamin C (from 70 to 100 mg), vitamin B1 (from 1.2 to 2.1 mg), vitamin B2 (from 1.5 to 2.4 mg), PP (from 16 to 28 mg).

The question of the possibility of using high or shock doses of vitamins (the so-called "megadoses") to increase performance and endurance is constantly being discussed. It is known that athletes' consumption of vitamins in quantities many times greater than the daily requirement of the body does not lead to a significant increase in performance and endurance. In addition, some antioxidant vitamins - C, E and beta-carotene - can have a pro-oxidant effect in megadoses [20].

Improving the vitamin status of military personnel helps to normalize biological rhythms when troops move over long distances, especially with a change of time zones, increases general and specific indicators, and accelerates the recovery of the body after intense physical exertion [15].

Currently, the general trend in improving the nutrition of military personnel is to abandon substances that have a strong effect and switch to a comprehensive rational nutrition system with the inclusion of vitamin-rich products in the daily diet. In particular, vitamin supplementation for military personnel serving in the Far North can be achieved by improving their nutrition [12].

In the process of analyzing the results of scientific research, the authors came to a number of conclusions. In particular, according to the analysis of scientific publications devoted to the problem of assessing the vitamin status of military personnel and methods for its correction, despite the decrease in the incidence of hypovitaminosis C, the level of hypovitaminosis B and D remains quite high. This situation increases the risk of developing a number of diseases. It has been shown that the problem of vitamin deficiency is most acute for military personnel in extreme military activities, in difficult climatic and geographical conditions, including in the Arctic. It was found that the need for vitamins is constantly increasing among professional athletes, whose physical and mental stress is equal to that of military personnel. At the same time, taking "megadoses", in particular antioxidant vitamins, does not improve performance and endurance, but sometimes has a pro-oxidant effect. It was determined that the correction of vitamin status should be carried out through a balanced diet (use of ordinary products), the inclusion of vitamin-enriched consumer products in the daily diet, the use of special (functional) products intended for certain categories of the population, and the intake of vitamin-mineral complexes. It was found that due to the limited possibilities of rational nutrition, the decrease in the content of vitamins and minerals in fruit and vegetable and livestock products, as well as the high cost of the method of using fortified and functional products, which are considered effective in compensating for vitamin deficiency, they cannot be a means of mass use. The most realistic and effective method of correcting the vitamin-mineral status of the population and military personnel is the use of vitamin and mineral complexes. It was substantiated that new complex preparations with physiologically based doses of vitamins and minerals, which have anti-infective and immunomodulatory properties and contain adaptogens and probiotics, are promising.

**CONCLUSION.** Analysis of some articles, information and other data published over the past 15 years based on the results of scientific work on the study of the vitamin status of military personnel showed that the vitamin status of military personnel performing their duties in conditions of physical and psychological stress, as well as unfavorable climatic and geographical-landscape conditions, is characterized by a deficiency of a number of vitamins (vitamins C, B1, B2, PP). This situation indicates the need to conduct research to determine the level of vitamin status



among military personnel of our country's Armed Forces and whether there is a need to correct it.

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