



# THE ROLE OF NUTRITION IN THE PREVENTION OF TRANSIENT RESPIRATORY INFECTIONS AMONG MILITARY PERSONNEL

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## Abstract:

The article presents an analytical overview of modern scientific research dedicated to the issues of spread and prevention of transient (acute) respiratory infections among military personnel in various countries. The epidemiological features of respiratory tract infections in the military environment, as well as risk factors including crowded living conditions, intensive physical exertion, psychoemotional stress, climatic conditions, and nutritional status, are considered.

The results of randomized clinical trials and systematic reviews devoted to the role of vitamins C and D, zinc, probiotics, and energy sufficiency of the diet in the prevention of upper respiratory tract infections are analyzed. It is shown that correcting micronutrient deficiencies and ensuring adequate energy balance help to reduce the frequency and severity of acute respiratory infections in the context of military service.

**Keywords:** military personnel, acute respiratory infections, immunity, nutrition, vitamins D and C, probiotics, micronutrients, military service.

## INTRODUCTION.

Acute respiratory infections (ARIs) remain one of the most common causes of temporary disability among military personnel. The conditions of military service—crowded living, intensive physical loads, exposure to extreme climatic factors, psychological stress—create a favorable environment for the circulation of respiratory pathogens and reduction of immune resistance of the body. According to epidemiological studies, the incidence of respiratory infections among military personnel may exceed similar indicators among the civilian population by 2–3 times. The most frequently detected pathogens are adenoviruses, influenza A and B viruses, rhinoviruses, coronaviruses, *Streptococcus pneumoniae*, and *Streptococcus pyogenes*. At the same time, up to 40% of cases remain etiologically unclarified. In recent years, special attention has been paid to the study of modifiable risk factors, particularly the nutritional status of military personnel, as a potentially manageable tool for the prevention of infectious disease.

## GOAL OF THE STUDY.

To analyze publications from the last 10–15 years, devoted to studying the connection between the nutritional status of military personnel and the incidence of acute respiratory infections, with the aim of substantiating directions for improving preventive measures.

## MATERIALS AND METHODS.

A search for publications was conducted in the PubMed, Google Scholar, CrossRef, and PMC databases (October 2025). The following keywords were used: "military personnel", "soldiers", "respiratory infection",

"adenovirus", "influenza", "nutrition", "vitamin D", "vitamin C", "probiotics", "immune response", "military training".

Randomized controlled trials (RCTs), cohort studies, systematic reviews, and meta-analyses published mainly over the last 10 years were included in the analysis.

## DISCUSSION OF RESULTS

**Vitamin C.** In a randomized double-blind study by Kim et al. (2020) involving 1,444 Korean army recruits, vitamin C supplementation (6,000 mg/day) for 30 days led to a 20% reduction in the risk of developing the common cold compared to placebo (OR=0.80). The most pronounced effect was observed among non-smoking servicemen and those with average physical fitness.

These findings suggest the potential effectiveness of vitamin C under conditions of intensive training and adaptation-related stress.

**Vitamin D.** Harrison et al. (2021) demonstrated that vitamin D deficiency is widespread among recruits during the winter period (sufficient levels detected in only 21%). Individuals with adequate 25(OH)D levels had a 40% lower risk of developing acute respiratory viral infections (ARVI).

**Vitamin D3** supplementation (1,000 IU/day, then reduced to 400 IU/day) or simulated sunlight exposure reduced symptom severity by 15% and disease duration by 36%.

A meta-analysis by Abioye et al. (2021) confirmed the preventive effect of vitamin D, especially at daily doses of  $\geq 2,000$  IU in individuals with baseline deficiency.



**Probiotics.** Research findings on probiotics show mixed but promising results.

A Chinese RCT (Zhang et al., 2017) showed that prolonged intake of *Lactobacillus casei* Shirota increased IgA, CD3, and CD4 levels and decreased inflammatory markers (CRP, IL-1). There was a trend towards reduced infection frequency.

Noorifard et al. (2020) observed increased IgA and CD4 levels after 12 weeks of *Bacillus coagulans* supplementation in military athletes.

However, Kalima et al. (2016) did not find a significant reduction in overall incidence, although a decrease in symptom severity was noted among recruits.

Thus, probiotics may have an immunomodulatory effect, especially under conditions of intensive physical load.

**Energy Balance and Protein Supply.** Margolis et al. (2016) demonstrated that during arctic military exercises, energy deficit reached  $-3,313$  kcal/day. Negative energy balance was associated with impaired protein metabolism.

Soldiers with the highest energy intake achieved a positive protein balance, confirming the importance of adequate energy supply in maintaining immune function. Insufficient nutrition increases infection risk, while excessive nutrition and obesity promote chronic inflammation and immune dysfunction (Hatch-McChesney et al., 2023).

**Zinc.** In the study by Wawerka et al. (2009), a daily intake of 15 mg zinc did not reduce doctor-confirmed cases of acute upper respiratory tract infections but increased the number of asymptomatic episodes.

Meta-analyses suggest a possible reduction in symptom duration, but the preventive effect remains debatable.

#### **Organizational and Epidemiological Measures**

Korzyniewski et al. (2014) and Sanchez et al. (2015) emphasize the importance of vaccination (against influenza, adenoviruses, pneumococcus), sanitary-hygienic interventions, and epidemic control.

During military operations, up to 40–70% of service personnel seek medical attention for upper respiratory tract infections. Limited diagnostic capabilities often lead to the over-prescription of antibiotics.

#### **SUMMARY OF RESULTS**

A review of more than 20 studies showed that nutritional status is a significant modifiable risk factor for acute respiratory infections (ARIs). Deficiencies in vitamin D and C increase susceptibility to infections, probiotics may enhance mucosal immunity (sIgA), and energy deficit and protein insufficiency reduce immune resistance. Universal mass prevention without accounting for underlying deficiencies is not scientifically justified; a targeted approach (screening plus personalized correction) is more effective.

#### **CONCLUSION:**

Maintaining adequate energy and micronutrient intake is an evidence-based strategy for reducing the incidence and severity of acute respiratory infections among military personnel.

The optimal preventive model is an integrated approach that includes:

- Screening for nutritional status (vitamin D, iron, zinc).
- Targeted correction of identified deficiencies.
- Ensuring sufficient protein and energy intake.
- Use of probiotics under intensive physical load.
- Vaccination.
- Sanitary and hygienic measures.

Further randomized studies are needed to refine dosages and determine the clinical significance of nutritional interventions in different military populations.

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