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THE PROBLEM OF INSUFFICIENT VITAMIN D INTAKE IN THE DIET OF INTERNALLY DISPLACED PERSONS

ПРОБЛЕМА НЕДОСТАТНЬОГО СПОЖИВАННЯ ВІТАМІНУ D У РАЦІОНІ ХАРЧУВАННЯ ВНУТРІШНЬО ПЕРЕМИЩЕНИХ ОСІБ

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Introduction. The armed aggression against Ukraine has resulted in profound medical and social consequences, including the emergence of a large population of internally displaced persons (IDPs) who experience increased physical and psycho-emotional vulnerability [1, p. 3]. Military conflict is associated with high levels of chronic stress, anxiety and depressive disorders, post-traumatic stress disorder, and reduced adaptive capacity. According to the World Health Organization, approximately 264 million people worldwide suffer from depression, highlighting the global scale of the problem and its potential exacerbation under wartime conditions [2].

Vitamin D deficiency remains a significant public health concern across all regions of Ukraine. Epidemiological studies conducted in 2020 in the southern regions of Ukraine demonstrated that only 35.1% of residents had optimal vitamin D status, while 31.3% exhibited insufficiency and 33.7% were diagnosed with deficiency [3, p. 94].

The dietary patterns of IDPs largely depend on emergency food assistance. An analysis of the harmonized humanitarian food basket (as of July 2024) revealed its “partial adequacy”: despite an excess of vitamin A (209% of the recommended level), it lacks a balanced vitamin D profile [4, p. 10]. Diets primarily based on refined cereals and canned products fail to provide sufficient nutrients to compensate for limited

sunlight exposure. At the same time, Ukraine possesses industrial infrastructure for the fortification of oil and flour, which is currently underutilized [4, p. 12].

Vitamin D insufficiency increases susceptibility to infectious diseases and contributes to the progression of chronic conditions such as osteoporosis, diabetes mellitus, and cardiovascular diseases [5, p. 16]. In the context of restricted access to healthcare services for displaced populations, this creates a risk of long-term deterioration of public health and national resilience.

Aim. To assess vitamin D intake among IDPs based on actual dietary patterns and to determine the prevalence of inadequate consumption considering dietary structure, total energy intake, and macronutrient distribution.

Materials and methods. The study was conducted as a cross-sectional analytical assessment of actual dietary intake in an adult population. A total of 168 individual daily diets of IDPs were analyzed. Vitamin D intake was evaluated by calculating the total daily intake from all recorded food products.

Dietary assessment was performed using a quantitative calculation method based on a three-day food record (selected days within one week), including detailed information on consumed products and their quantities (g/day). For each food item, energy value, protein, fat, carbohydrate, and vitamin D content were determined using standard food composition tables and validated nutrient databases. Total daily vitamin D intake (IU/day) was calculated by summing the cholecalciferol content from all consumed foods within each individual diet. The proportion of proteins, fats, and carbohydrates was expressed as a percentage of total daily energy intake.

Adequacy of vitamin D intake was assessed by comparison with the recommended daily intake for adults of 600 IU/day (15 µg). An additional threshold of 400 IU/day was applied for stratified analysis. Diets were classified as adequate (≥ 600 IU/day), insufficient (< 600 IU/day), or critically low (< 400 IU/day).

Results. Analysis of IDPs' dietary patterns demonstrated that the mean daily vitamin D intake was 358.7 IU (SD = 349.3 IU), with a median of 228.7 IU, indicating a right-skewed distribution. The minimum value was 0 IU and the maximum reached 1,783.1 IU. The discrepancy between the mean and median suggests the presence of individual diets with high vitamin D intake—primarily due to the consumption of fortified foods and additional vitamin D supplementation—which substantially influenced the mean value.

Comparison with the recommended intake of 600 IU/day showed that 77.98% of diets failed to meet the physiological requirement. Even

when applying the lower threshold of 400 IU/day, inadequate intake was observed in 64.9% of cases. Only 22.0% of diets met or exceeded 600 IU/day.

Structural analysis of dietary sources revealed that the main contributors of vitamin D were fatty fish species (salmon, mackerel, trout, herring); however, their inclusion in diets was sporadic. The consumption frequency of each of these products did not exceed 8-9% within the sample. Commonly consumed products (eggs, milk, cheese, butter) were reported more frequently, yet their contribution to total vitamin D intake was insufficient to achieve recommended levels in the absence of regular fish consumption or fortified foods.

The distribution pattern was clustered: the majority of diets were characterized by intake levels below 300 IU/day, whereas values above 600 IU/day were observed only in individual cases with substantial fish consumption. Thus, adequate vitamin D intake in the studied population appears to be incidental rather than systematic.

Additional analysis of energy intake indicated that the mean daily caloric value was generally within physiological requirements for adults, although considerable interindividual variability was noted. Macronutrient distribution demonstrated a tendency toward higher proportions of fats and carbohydrates with relatively moderate protein intake. In several diets, fat intake exceeded the recommended 30–35% of total energy, while protein did not consistently reach the optimal 15–20%. This dietary pattern was not associated with improved vitamin D intake, as the increased fat proportion was mainly derived from animal fats and processed foods rather than fatty marine fish – the primary natural source of cholecalciferol.

Overall, the findings indicate that insufficient vitamin D intake among IDPs is associated not only with quantitative aspects of the diet but also with its qualitative structure and the low frequency of consumption of specific vitamin D-rich foods.

Conclusions. The analysis demonstrated that more than 75% of IDP diets do not meet the recommended vitamin D intake of 600 IU/day, and the median intake is substantially below the physiological requirement, indicating the systemic nature of the problem. The primary determinants of inadequate intake are insufficient consumption of fatty marine fish and the lack of regular use of fortified foods and cholecalciferol supplements. Despite generally adequate caloric intake, the dietary structure fails to ensure an appropriate micronutrient profile, highlighting the qualitative nature of the deficiency.

The study limitations include its cross-sectional design, the absence of a control group, reliance on self-reported dietary data (with potential selection, recall, and reporting bias), and the use of a calculation-based

method to estimate vitamin D intake without laboratory assessment of serum 25(OH)D levels. Future research should involve larger sample sizes, demographic stratification, and integration of dietary assessment with biochemical markers to enhance the strength and validity of the evidence.

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