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# **SCIENTIFIC RESEARCH: MODERN CHALLENGES AND FUTURE PROSPECTS**



**PROCEEDINGS OF XIII INTERNATIONAL  
SCIENTIFIC AND PRACTICAL CONFERENCE  
AUGUST 4-6, 2025**

**MUNICH  
2025**

# **SCIENTIFIC RESEARCH: MODERN CHALLENGES AND FUTURE PROSPECTS**

Proceedings of XIII International Scientific and Practical Conference

Munich, Germany

4-6 August 2025

**Munich, Germany**

**2025**

**UDC 001.1**

The 13<sup>th</sup> International scientific and practical conference “Scientific research: modern challenges and future prospects” (August 4-6, 2025) MDPC Publishing, Munich, Germany. 2025. 208 p.

**ISBN 978-3-954753-06-2**

The recommended citation for this publication is:

*Ivanov I. Analysis of the phaunistic composition of Ukraine // Scientific research: modern challenges and future prospects. Proceedings of the 13th International scientific and practical conference. MDPC Publishing. Munich, Germany. 2025. Pp. 21-27. URL: <https://sci-conf.com.ua/xiii-mizhnarodna-naukovo-praktichna-konferentsiya-scientific-research-modern-challenges-and-future-prospects-4-6-08-2025-myunhen-nimechchina-arhiv/>.*

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# MEDICAL SCIENCES

## THE PROBLEM OF VITAMIN D DEFICIENCY AMONG CARDIOLOGY PATIENTS

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**Introduction.** It's estimated that 30% to 50% of the world's general population suffers from vitamin D deficiency or insufficiency, with some reports indicating that up to 1 billion people have this condition. In Europe, vitamin D deficiency is found in approximately 20% of the population in Northern Europe, 30-60% in Western, Southern, and Eastern Europe, and up to 80% in Middle Eastern countries (Cosentino N., 2021; Lips, P., 2019).

Vitamin D has been traditionally recognized as a crucial factor in the regulation of calcium and phosphate homeostasis, which is vital for adequate bone mineralization and the prevention of conditions such as rickets and osteomalacia. However, over the past decades, there has been a significant surge of interest in its broader, extra-skeletal roles, particularly concerning the cardiovascular system. This is attributed to the widespread distribution of vitamin D receptors (VDRs) in various human tissues and cells, including immune cells, skin, brain, and, critically, in the heart, vascular smooth muscle cells, and endothelium. This extensive presence of VDRs indicates a significantly wider spectrum of vitamin D's influence on overall health (Pál É., 2023; Haider F., 2023).

A growing body of observational studies consistently reports a significant association between low vitamin D levels and various cardiovascular diseases

(CVDs) and conditions. These include arterial stiffness, arterial hypertension, atherosclerosis, left ventricular hypertrophy, coronary artery disease, heart failure (HF), and arrhythmias (Nardin M., 2024; Condoleo V., 2021). The prevalence of vitamin D deficiency is notably higher in patients with established CVDs compared to the general population, often exceeding 50% in many subgroups. This consistently high prevalence of vitamin D deficiency across different cardiology patient populations represents a significant clinical indicator, which consequently defined the aim of the present study (Norman P.E., 2014).

**Aim.** The purpose of the work is to evaluate vitamin D levels among cardiology patients.

**Materials and Methods.** To achieve this research objective, a comprehensive examination of 49 cardiology patients was conducted in an outpatient setting at the MNE « Clinic «Family Doctor» of Shyrokye Village Council, Zaporizhzhia, Ukraine. The average age of the participants was  $(64.3 \pm 1.9)$  years. Vitamin D deficiency was verified based on generally accepted diagnostic criteria as defined by the Consensus of Ukrainian Experts (2023) (Hryhorieva N.V., 2023).

*The level determination of vitamin D.* 25(OH)D levels were determined in laboratories in Zaporizhzhia: CSD LAB for 28 patients (referred by the National Health Service of Ukraine) and "Diaservice" Medical company for 21 patients (on a commercial basis). Measurements were reported in ng/mL.

**Results and Discussion.** Patients were primarily diagnosed with Coronary Heart Disease (CHD), accounting for 17 cases (34.7%); Hypertension (HT), observed in 22 cases (44.9%); and Metabolic Cardiomyopathy, present in 10 cases (20.4%). The distribution based on the main presenting complaint was as follows: palpitations were reported by 16 patients (32.7%); fatigue by 12 patients (24.5%); weakness by 7 patients (14.3%); dizziness by 6 patients (12.2%); cardiac rhythm disturbances by 4 patients (8.2%); exertional dyspnea by 2 patients (4.1%); and exertional chest pain by 2 patients (4.1%).

The median 25(OH)D level was 18.6 (13.1; 24.1) ng/mL, with a minimum level of 5.1 ng/mL and a maximum of 36.9 ng/mL. The proportion of patients with

vitamin D deficiency was 61.2% (n = 30), while 28.6% (n = 14) had vitamin D insufficiency, only 10.2% (n = 5) exhibited normal vitamin D levels. A negative correlation was found between age and vitamin D levels ( $R = -0.35$ ,  $p = 0.01$ ).

Current guidelines do not endorse the universal application of vitamin D supplementation for the prevention of cardiovascular diseases (CVDs). Instead, a differentiated approach is recommended, focusing on screening and correction in individuals with established risk factors for vitamin D deficiency or specific comorbidities where deficiency is associated with poorer overall outcomes (Demay M. B., 2024).

Instead, the application of vitamin D in cardiology patients is part of addressing broader general health concerns, comorbidities, and known risk factors for vitamin D deficiency itself. The clinical decision to prescribe supplementation should be based on the patient's specific vitamin D status and the presence of conditions where correction of vitamin D deficiency has demonstrated benefits (Mattioli A. V., 2024; Sha, S., 2025).

**Conclusions.** Thus, a large proportion of cardiology patients exhibit vitamin D deficiency. Clinical management of vitamin D deficiency in cardiology patients should transition from a broad "CVD prevention" strategy to a more targeted approach, focusing on correcting deficiency in high-risk individuals. Clinicians should prioritize screening for vitamin D deficiency in high-risk cardiology patient populations and manage deficiencies according to established guidelines, rather than solely for unproven direct cardiovascular benefits.

**Future Research Directions.** Further research is needed to elucidate the complex interplay between vitamin D, other biological systems (e.g., inflammation, RAAS activation, endothelial dysfunction), and established cardiovascular risk factors. Additional studies are necessary to identify specific patient phenotypes who may genuinely benefit from vitamin D supplementation and to better understand the intricate relationship between vitamin D status and cardiovascular diseases.

**Conflicts of interest:** Authors have no conflict of interest to declare.



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