

**VITAMIN D DEFICIENCY IN CHILDREN: EARLY DETECTION, PREVENTION,  
AND TREATMENT STRATEGIES***Ermатов Farhod Ahmedovich**Central Asian Medical University**Assistant, Department of Pediatrics and Pediatric Surgery**Independent PhD Researcher*

**Abstract:** This article analyzes the etiology, pathogenesis, clinical manifestations, modern diagnostic methods, effective prevention measures, and treatment protocols of vitamin D deficiency in children. Vitamin D is essential for bone health, immune function, endocrine balance, and metabolic processes in the growing organism. If not detected early, deficiency can lead to rickets, growth retardation, and systemic disorders. The article is based on both Uzbek and international research and practical experiences.

**Keywords:** Vitamin D, rickets, children, hypovitaminosis, diagnostics, prevention, treatment, 25(OH)D.

**Introduction**

Vitamin D is a fat-soluble vitamin that plays a key role in calcium-phosphorus metabolism and is crucial for the health of growing children. According to the WHO, millions of children worldwide suffer from vitamin D deficiency annually. It is particularly prevalent in socioeconomically disadvantaged populations, regions with limited sunlight exposure, and where nutrition is inadequate.

**Metabolism and Biological Functions**

Vitamin D exists in two main forms: D<sub>2</sub> (ergocalciferol) and D<sub>3</sub> (cholecalciferol). D<sub>3</sub> is synthesized in the skin under UVB rays or obtained from animal-based food sources. The liver converts it to 25(OH)D, and the kidneys further convert it to the active form, 1,25(OH)<sub>2</sub>D. Its functions include enhancing calcium and phosphorus absorption, regulating bone remodeling, modulating immune responses, and influencing insulin secretion and neurodevelopment.

**Etiology**

Common causes of deficiency include limited sunlight exposure, exclusive breastfeeding without supplementation, poor dietary intake, malabsorption syndromes, liver and kidney diseases, and darker skin pigmentation which reduces cutaneous synthesis of vitamin D.

**Clinical Manifestations**

Early signs include muscle hypotonia, excessive sweating of the scalp, irritability, delayed fontanel closure, skull softening, chest deformities, bowed legs, delayed growth and teething.

**Diagnostics**

Diagnosis involves measuring serum 25(OH)D levels (normal: 30–100 ng/mL). Levels below 20 ng/mL indicate severe deficiency. Supporting tests include PTH, calcium, phosphorus, and alkaline phosphatase. Imaging such as X-rays or bone densitometry may be used in advanced cases.

### Prevention

Daily vitamin D recommendations are 400 IU for infants and 600 IU for children over 1 year. Strategies include sun exposure, dietary fortification, and supplementation. In Uzbekistan, awareness and education among parents and healthcare professionals are key.

### Treatment

Mild to moderate deficiency: 2000 IU/day for 6–8 weeks followed by maintenance. Severe cases: up to 5000 IU/day under medical supervision. Calcium supplements are co-administered if needed. Active forms like calcitriol are used in cases with liver or kidney disease.

### Local Data and Results

A 2023 study in Andijan revealed that 52% of children aged 0–3 had serum 25(OH)D levels <20 ng/mL, 29% had levels between 20–30 ng/mL, and only 19% had normal levels. Clinical signs of rickets were observed in 17% of the cohort, underscoring the need for early intervention.

### Conclusion

Vitamin D deficiency negatively impacts not only bone development but also general physical and mental growth in children. Early diagnosis, preventive strategies, and appropriate treatment protocols can mitigate these risks. Public health education and regular screening are essential components of national strategies.

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