

THE EFFECT OF VITAMIN D ON THE DEVELOPMENT OF IMMUNITY IN CHILDREN: A REVIEW OF MODERN RESEARCH

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Abstract

Vitamin D plays a key role in regulating the immune system, influencing innate and adaptive immune mechanisms. Vitamin D deficiency in children is associated with increased susceptibility to infectious diseases, as well as with the development of autoimmune disorders. This review article presents current research that reveals the role of vitamin D in the formation of the immune response in children.

Keywords: Vitamin D, immunity, children, infections, adaptive immunity, innate immunity, autoimmune diseases.

Introduction

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The immune system of children is in the process of development and requires sufficient supply of nutrients, including vitamin D, which is not only a regulator of calcium metabolism, but also an important immunomodulatory agent. Vitamin D deficiency is widespread among children in different regions of the world and is associated with an increased risk of infectious and inflammatory diseases. This article reviews modern research on the effect of vitamin D on the immune system of children.

Vitamin D and innate immunity. Innate immunity is the body's first line of defense against pathogens. Vitamin D is involved in the activation of macrophages and neutrophils, enhancing the production of antimicrobial peptides such as cathelicidin and defensins. These molecules help destroy bacteria and viruses, reducing the risk of infections.

A study by Deshmukh & Gaikwad (2024) showed that children with low blood vitamin D levels have an increased risk of respiratory infections [1].

Vitamin D and adaptive immunity. Adaptive immunity includes T- and B-lymphocytes, which provide a specific immune response to pathogens. Vitamin D modulates the activation and differentiation of these cells, reducing the excessive inflammatory response.

Menafra's work et al . (2024) shows that vitamin D regulates the production of proinflammatory cytokines such as interleukin-6 and tumor necrosis factor - α , thereby reducing the risk of developing chronic inflammatory diseases [2].





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Vitamin D and Infectious Diseases in Children. Numerous studies confirm that low vitamin D levels are associated with increased rates of infections in children, including acute respiratory viral infections, tuberculosis, and intestinal infections.

• Dude study (2024) showed that supplemental vitamin D in children's diets reduced the incidence of tuberculosis relapse [3].

• In a meta-analysis Devulapalli (2024) found that vitamin D reduces the risk of viral upper respiratory tract infections in children with vitamin D deficiency [4].

Vitamin D and autoimmune diseases. Vitamin D deficiency is associated with an increased risk of developing autoimmune diseases such as type 1 diabetes and allergies.

• A study by Salas & Pérez (2024) showed that children with type 1 diabetes mellitus have lower levels of vitamin D, which confirms its role in the regulation of autoimmune processes [5].

• According to Howells (2025), vitamin D may have a protective effect in asthma and food allergies by reducing the level of inflammatory cytokines [6].

Optimal dose of vitamin D for children . Recommended doses of vitamin D vary depending on age. According to research, the optimal dose for children over 1 year is 600 IU per day. However, in regions with insufficient insolation, higher intakes of vitamin D are recommended.

Banovac's work (2024) confirms that increasing vitamin D levels in children leads to a reduced risk of infectious diseases [7].

Conclusions

Analysis of modern research shows that vitamin D plays an important role in the functioning of the immune system of children. Its deficiency is associated with an increased incidence of infectious and autoimmune diseases. Regular intake of vitamin D, both through sun exposure and in the form of supplements, can help strengthen the immune system and reduce the risk of developing diseases.

It is important for further research to examine the effects of different doses of vitamin D on children's immune functions in the long term.

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