

# THE SIGNIFICANCE OF VITAMIN D IN THE DEVELOPMENT OF REPETITIVE DISEASES OF THE RESPIRATORY SYSTEM IN CHILDREN

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**Abstract.** *According to the World Health Organization, every year one in three of the world's population suffers from respiratory diseases, which make up 90% of all infectious diseases. The increasing incidence of the disease in the population, insufficient study of pathogenetic mechanisms and predictive factors, necessitates the need to carry out scientific research on this disease.*

**Keywords:** *vitamin D, recurrent respiratory diseases, akvodetrim.*

**Actuality:** In almost half of the population of all countries in the world, hypovitaminosis D is hidden and is often detected during the diagnosis of other diseases, which leads to immune deficiency in children and the increase in the number of frequent diseases among them. That is why the death rate of children due to respiratory system diseases has been determined to be more than 60%. "Respiratory diseases are often considered a global public health problem due to their high prevalence and severity." Wide spread of deficiency and deficiency of vitamin D in the whole world "The hidden non-infectious-metabolic epidemic of the 21st century is associated with a high risk of medical and social consequences for children's health" [1,2]. The increasing incidence of the disease in the population, insufficient study of pathogenetic mechanisms and predictive factors, necessitates the need to carry out scientific research on this disease.

The mortality rate (1-5 years) due to lower respiratory tract infections (mainly pneumonia) is considered to be one of the highest causes compared to other diseases. In 2015, about 10 million children died worldwide, so 20% or 1.9 million children died from pneumonia. In the origin of diseases of the lower respiratory tract, especially in children of early age, socio-economic status, ethnicity, lack of immunization, exposure to tobacco smoke, air pollution and other related chronic diseases. [3]

According to the definition of the World Health Organization (WHO), children who are frequently sick have acute respiratory diseases more than 8 times in a year [6]. Frequently sick children or patients with recurrent ORI are not diagnosed, they are considered to have frequent respiratory infections due to transient disorders of the body's defense systems that can be corrected without organic changes under dispensary control. The occurrence of respiratory infections in frequently sick children does not depend on congenital and hereditary pathological conditions. [4] The purpose of the study is to study the importance of vitamin D in recurrent respiratory diseases in children and to develop scientifically based treatment guidelines.

As the material and method of the research, the concentration of vitamin D in blood serum before and after treatment in 168 children from the group of frequently ill children aged 1-18, who were monitored in the clinic of the Tashkent Pediatric Medical Institute and the family polyclinics of the Tashkent City Health Association from 2018 to 2022. was determined. The examined patients were divided into two large groups depending on the localization of the disease. The first group included 112 children with diseases of the upper respiratory tract (rhinitis, acute pharyngitis,

acute sinusitis, acute tonsillopharyngitis and acute laryngitis). The second group included 56 patients with lower respiratory tract and respiratory organs (acute tracheitis, acute bronchitis, acute and protracted pneumonia). 69 children were selected for the control group.

The distribution of sick children by age is as follows: 59 (35.1%) children of early age, 42 (25%) children of preschool age from 4 to 7 years old, 27 (16.1%) children of junior school age, adolescents from 11 to 18 years old 40 people (23.8%) made up. The distribution of patients by gender is dominated by the number of boys (87 people, 51.7%).

Based on the national program "Prevention of vitamin D deficiency and deficiency in the Republic of Uzbekistan" developed in 2019, if vitamin D deficiency is  $< 20$  ng/ml of 25(OH)D in the blood serum, deficiency - from 20 to 30 ng/ml, and adequate level -30 above ng/ml. [5]

Research results: According to the results of the research, vitamin D deficiency in the second group, specifically in lower respiratory tract pathologies, was statistically more convincing compared to the level of vitamin D in the first group when compared to the control group ( $r < 0.001$ ).

***Vitamin D in the main and control group patient children comparative description***

Serum levels of vitamin D	Control group (n = 64)	CONTB (n = 112)	CONTK (n = 56)	P
Deficiency $< 20$ ng/ml	14 (21,8 %)	22 (19,6 %)	36 (64,2 %)	$< 0,001$
Deficiency 20–30 ng/ml	8 (12,5 %)	69 (61,6 %)	11 (19,6 %)	$< 0,001$
Reference value $> 30$ ng/ml	42 (65,6 %)	21 (18,7 %)	9 (16,2 %)	$< 0,001$

Note: *p*-analyzed difference of parameters in control, high and low QRK patients

Statistically significant deficiency of vitamin D in patients with recurrent diseases of the upper respiratory tract compared to the control group ( $r < 0.001$ ) encourages us to consider it as the main etiological factor leading to a violation of vitamin D metabolism.

In patients of this group, vitamin D deficiency is observed more frequently ( $r < 0.001$ ), disease localization, and the chronic nature of the inflammatory process.

According to the results, despite the fact that 60% of the children taken for control had a sufficient amount of vitamin D, 35% of them had a decrease in the amount of vitamin D in one way or another, especially deficiency and deficiency were 22.6 and 12.9%, respectively. The results of this study confirm that hypovitaminosis D is one of the most common medical and social problems among children.

As can be seen from the data in the table, uneven changes in the amount of vitamin D with increasing age are characteristic of recurrent respiratory diseases in the upper respiratory tract, while in pathological cases of the lower respiratory tract, on the contrary, a sharp decrease in the amount of vitamin D was observed.

Based on the data in the table, it should be noted that the lack of vitamin D, especially its deficiency, increases susceptibility to the disease, based on the initial and high concentration of risk factors entering the upper respiratory organs through external atmospheric air and the anatomico-physiological characteristics of the wall of the lung.

Children of the first group had insufficient serum vitamin D compared to the control group at all ages. It should be noted that the tradition of increasing vitamin D levels in adolescents up to

the limit of normal values can be explained by the increasing social opportunities of children of this age.

***Comparative description of the amount of vitamin D in the studied groups depending on the age periods***

Research groups	Follow-up periods			
	1-3 years old	4-7 years old	8-12 years old	13-18 years old
ЮНЙҚК (n = 112)	16,24 ± 1,14 (n = 36)	21,74 ± 0,32 (n = 33)	21,2 ± 1,82 (n = 19)	28,44 ± 2,14 (n = 24)
ПНЙҚК (n = 56)	18,17 ± 2,34 (n = 23)	22,41 ± 1,46 (n = 9)	13,25 ± 2,24 (n = 8)	11,62 ± 1,30 (n = 16)
Control group (n = 64)	19,32 ± 1,21 (n = 16)	25,24 ± 1,26 (n = 16)	34,12 ± 1,73 (n = 16)	33,51 ± 1,36 (n = 16)
P	> 0,01	> 0,01	< 0,01	< 0,01

Note: *p*-analyzed difference of parameters in control, high and low QRK patients

Statistically reliable differences in the level of vitamin D between patients of the first and second observation groups from the period of junior school age correspond to vitamin D deficiency in patients with diseases of the upper respiratory tract, and deficiency values in children of the second group ( $r < 0.01$ ).

In the comparative analysis of the number of bronchopulmonary exacerbations in children with CRK, it was found that exacerbations of the clinical manifestation with vitamin D deficiency were recorded 3-4 times a year ( $r < 0.001$ ), while the number of exacerbations in the reference indicators did not exceed 2 times a year ( $r = 0.016$ ).

Despite the fact that in the case of vitamin D deficiency, 39.9% of children had more than 4 recurrences per year, the difference was statistically insignificant ( $r = 0.071$ ).

According to the results of statistical analysis, vitamin D deficiency is associated with the risk of severe recurrence ( $r = 0.047$ ). The results of this work confirm the opinion of many researchers about the direct participation of active metabolites of vitamin D in the elimination of inflammatory processes. According to the analysis of the obtained results, the function indicators of the lungs were determined in the deficiency values, and it was found that the vitamin D deficiency in the patients was statistically significantly correlated with the level of the vitamin D content in the blood serum. External respiratory activity values below normal values up to 60% correspond to vitamin D values ( $r < 0.001$ ,  $r = 0.007$ , respectively).

Analysis of changes in vitamin D levels in blood serum allows us to emphasize that it has a significant impact on the description of the course of CRK in children. At the same time, the degree and severity of the changes prompts the analysis of the etiological factors of the disease.

During the study, it was found that the concentration of calcidiol in blood serum affects the phenotypic characteristics of CRKs due to genetic and non-heritable mechanisms of chronic inflammation control. A correlation between vitamin D supply, the number and severity of disease outbreaks, the microbiological nature of the respiratory tract, and the functional indicators of the lungs was determined. According to the results of instrumental examination methods, deficiency of vitamin D in blood serum is directly related to severe course of clinical manifestations and decrease in functional parameters of lungs.

Despite the fact that doctors have a large number of drugs for the treatment and prevention of OCD, this problem remains relevant today. But their meeting in children corresponds to 3-7 years old. The study shows that vitamin D deficiency and deficiency are common among children, that vitamin D deficiency is associated with the incidence of various infectious diseases, that vitamin D is involved in the regulation of immunity against infection, and that it is appropriate to use it as a nonspecific prevention of respiratory diseases. In the background of stimulation of innate immunity and increase of protection indicators against infection, prolonged use of vitamin D preparations is considered appropriate for children aged 3-7 years under the influence of vitamin D. For this purpose, the drug Akvadetrim mecelial solution was recommended.

Vitamin D has been recommended as an adjunctive treatment for CKD. The drug was recommended based on the program "Prevention of vitamin D deficiency and deficiency in the Republic of Uzbekistan" developed in 2019 in a therapeutic dose based on the amount of vitamin D in the blood serum. 20-30 ng/ml 2000 IU, 10-20 ng/ml-3000 IU, 10 ng/ml 4000 IU daily for 1 month is recommended.

The amount of vitamin D in the blood of children is shown in the following table, based on the results after the course of treatment.

Research groups	Follow-up periods							
	1-3 years old		4-7 years old		7-11 years old		11-18 years old	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
CONTB (n = 112)	17,84 ± 1,24 (n = 36)	19,45 ± 1,32* (n = 36)	24,14 ± 0,46 (n = 33)	26,23* ± 0,24 (n = 33)	31,42 ± 1,77 (n = 19)	32,22* ± 1,56 (n = 19)	33.01 ± 1,68 (n = 24)	35.35 ± 1,05 (n = 24)
CONTK (n = 56)	19,07 ± 2,04 (n = 23)	22,55* ± 1,77 (n = 23)	23,38 ± 1,08 (n = 9)	25,54* ± 1,02 (n = 9)	18,05 ± 1,98 (n = 8)	20,01* ± 1,44 (n = 8)	17,62 ± 1,05 (n = 16)	21,52** ± 1,19 (n = 16)

Note: \* -  $\leq 0.05$ ; \*\* -  $\leq 0.01$ ; \*\*\* -  $\leq 0.001$  the difference between the comparison groups was considered reliable when

As can be seen from the table, vitamin D serum levels in children of all age groups receiving therapeutic doses of vitamin D were found to be significantly higher compared to pre-treatment values in the observation age groups.

After one month, the therapeutic dose was continued for another 15 days in children whose re-examination was below 30 ng/ml. A prophylactic dose of 1000 IU was recommended in children whose vitamin D level was higher than 30 ng/ml after completing treatment with vitamin D.

Complex treatment and preventive use of vitamin D reduced the complications and negative consequences of respiratory diseases.

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