RELATIONSHIP OF VITAMIN D LEVEL INDICATORS AND THE COURSE OF ACUTE BRONCHIOLITIS IN CHILDREN

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Abstract. *Acute bronchiolitis most often occurs in children 1 year of life, which require in some cases inpatient treatment; in the world, acute bronchiolitis is the most common cause of hospitalization in children under 2 years of age. In recent years, extremely important data have been obtained in studying the role of vitamin D in the prevention and course of a number of widespread diseases of modern humans. According to numerous studies, it has been established that vitamin D deficiency leads not only to disruption of mineral and bone metabolism, but is also involved in the regulation of the immune response, as it has an optimizing effect on the functioning of nonspecific defense mechanisms and adaptive immunity, modulates the proliferation of T-lymphocytes, etc.*

Keywords: *acute bronchiolitis, vitamin D, newborns, respiratory syncytial virus.*

Actuality. Newborns are at high risk of developing life-threatening respiratory diseases such as acute bronchiolitis and pneumonia. Globally, 1.5 million children under 5 years of age die each year from only pneumonia, which exceeds the number of deaths from any other infectious disease [10].

Acute bronchiolitis is mainly caused by viral agents in children under 2 years of age. The disease generally has a mild clinical course, but severe cases are not uncommon. Data on the etiology of acute bronchiolitis in many countries vary significantly, but the undisputed leader is the respiratory syncytial virus (RSV), RSV causes from 60 to 80% of cases of acute bronchiolitis. The second place in the etiology of OB is occupied by rhinoviruses - from 14 to 30% of cases (in premature babies - up to 40%), followed by bocavirus (14-15%), metapneumovirus (3-12%), less often acute bronchiolitis is caused by enterovirus (serotype D- 68), adenovirus, coronavirus (not SARS-CoV-2), influenza viruses and M. pneumoniae; In total, these pathogens account for 1 to 8% of cases of acute bronchiolitis in children [15, 16].

Vitamin D is known to have an immunoregulatory function [2].

Vitamin D is a fat-soluble vitamin and acts as a steroid hormone. There is growing evidence for the role of vitamin D in the immune system. [14]. Dendritic cells and macrophages derived from human monocytes are known to synthesize the active form of vitamin D (calcitriol) [6]. Unlike the renal pathway, calcitriol synthesis in monocyte-macrophages is not regulated by calcium levels but depends on immune inputs. Activated vitamin D activates genes encoding proteins essential for adhesive, gap, and tight junctions, thereby maintaining epithelial cell integrity and enhancing innate immunity. Vitamin D induces the expression of cathelicidin peptide genes. Cathelicidins are known to have antimicrobial activity and are also involved in other immune functions such as chemotaxis, cytokine release, inflammation, vascular permeability and repair. Vitamin D also blunts the Th1 response by inhibiting IL12 secretion and enhances the Th2 response by directly inducing Th2 differentiation mainly through IL4 [2, 4]. Vitamin D suppresses adaptive immunity by reducing the production of proinflammatory cytokines by Th1 lymphocytes and suppressing the formation of memory cells and plasma cells [10].

Vitamin D is postulated to promote in utero lung growth and the development and enhancement of antimicrobial effects, leading to a reduction in early respiratory infections and providing immunomodulatory effects [8]. A meta-analysis of two studies supports the concept that maternal vitamin D supplementation protects against incident asthma in the offspring during the first three years of life, particularly in women with normal serum vitamin D levels (≥30 ng/mL) at randomization [12, 13].

Therefore, numerous studies have been conducted to examine the relationship between vitamin D and respiratory infections. Significantly lower vitamin D levels have been reported among children hospitalized with bronchiolitis, in contrast to several authors who observed no such differences [7,11].

Purpose of the study. Our purpose was to examine the association between the clinical severity of acute bronchiolitis and serum vitamin D levels in infants.

Materials and methods of research. The study was conducted in 1 city children's clinic in Tashkent. The work was carried out in 2022-2023, in the autumn-winter and spring periods. The study included 71 children. The first group consisted of 39 children diagnosed with acute bronchiolitis. The second group included 32 children with acute respiratory diseases (mainly pharyngitis, adenoiditis, laryngotracheitis, acute simple bronchitis), whose average age was 1.5±0.7 years. Controls included children hospitalized for noncommunicable diseases (eg, trauma, foreign bodies, neurological disorders). All children requiring admission to the pediatric intensive care unit and those with complex comorbidities (eg, chronic pulmonary disease or congenital anomalies) were excluded.

Clinical examination included questionnaires, medical history, and physical examination. Survey methods included: a survey to identify data on education, marital status of parents, a survey to identify past and concomitant diseases, a survey to identify allergic history, obstetric and gynecological history data (number of pregnancies, births, weight of newborns, dates of discharge from the hospital, vaccination calendar etc.).

General blood and urine tests, biochemical blood tests (AlT, AST, bilirubin, CRP), and instrumental studies (as indicated) were performed.

Serum vitamin D levels were measured on admission. Vitamin D deficiency was considered to be a decrease in the concentration of 25 (OH) D in the blood serum of less than 20 ng/ml (50 nmol/l); vitamin D sufficiency is when the concentration of 25 (OH) D in the blood serum was more than 30 ng/ml (75 nmol/l), and deficiency - the level of vitamin D in the blood remains in the range of 21-29 nanograms/ml [1, 5].

Research results. Of the 39 patients with bronchiolitis included in the study, 51.28% (n=20) were male children and 48.71% (n=19) were female. The average age of the children was 7.6±6.8 months, as shown in Table 1. Patients were hospitalized in the fall, winter and spring in 48.71% (n = 19), 25.64% (n = 10) and 25.64 % (n = 10) cases. A total of 13 patients (33.3%) required admission to the intensive care unit, and 26 (66.7%) were treated in regular wards. The average length of hospital stay was 7.26 ± 2.76 days. The mean length of stay in the intensive care unit was 3.3 ± 0.6 days.

A total of 5 patients (12.81%) had protein-energy malnutrition.

Of the 39 studied, 23 (58.97%) patients received vitamin D supplements (500 IU/day orally), and 16 of them (41.03%) stated that they did not. The average vitamin D level in the study group was 23.18 ± 13.45 ng/ml.

Table №1

Sex	Boys 51.28% (n=20)
	Girls 48.71% (n = 19)
Protein-energy malnutrition	Norm 34 (87.17%)
	Protein-energy malnutrition mild degree 4 (10.25%)
	Protein-energy malnutrition moderate degree 1 (2.56%)
Taking Vitamin D	23 (58.97%) took
	16 (41.03%) did not take
Passive smoking	Present 18 (46.15%)
	Absence 21 (53.85%)

Vitamin D levels were normal in 51.28% (n = 20) of patients, 28.2% (n = 11) were deficient, and 20.51% (n = 8) were vitamin D insufficient. Normal vitamin D levels were observed in 47.36% (n = 9) girls and 55% (n = 11) male patients, while there was no significant association between gender and vitamin D deficiency (p = 0.5). Among patients without malnutrition, 70% (n = 14) had normal vitamin D levels compared with 7.69% (n = 3) of patients with malnutrition. Although the latter group of patients had an increased incidence of vitamin D deficiency, the difference was not significant. In 35 (89.74%) of the examined children, the course of the underlying disease was moderate. Children (n=4) from the group with grades 2 and 3 BENP required treatment in the intensive care unit with subsequent transfer to a regular ward.

Among the children of the second group, the distribution of vitamin D levels was as follows: normal levels of vitamin D in 78.12% (n = 25) of patients, 12.5% (n = 4) - deficiency and 9.3% (n = 3)) - vitamin D deficiency. The average length of hospital stay was 5.14 ± 1.8 days, no stay in the intensive care unit was required.

Conclusions. Thus, based on the data obtained, the following conclusions can be drawn: the severity of broncho-obstructive syndrome is associated with a burdened premorbid background, the presence of passive smoking, which significantly aggravate the course of the underlying pathology; in the group of patients with OB, no statistically significant correlation was found between the level of vitamin D in the blood serum and the severity of bronchiolitis.

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