

## CLINICAL AND DIAGNOSTIC ASPECTS OF ACUTE BRONCHIOLITIS IN CHILDREN

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### Annotation:

Bronchiolitis is a common manifestation of lower respiratory tract infection in children under 9 months of age. So far, some clinical and diagnostic issues, in particular bronchiolitis caused by respiratory syncytial virus, have not been resolved. The article presents the results of studying the clinical, functional and immunological features of the course of acute bronchiolitis in children. The clinical presentation of bronchiolitis depends on the clinical form of the disease and the etiology of the disease, the main causative agent of which is the respiratory syncytial virus. The detected imbalance of the cytokine profile can be a sign of the severity of infectious bronchiolitis, which helps to determine the next tactics of patient treatment and improve clinical results.

**Keywords:** children, acute bronchiolitis, clinic, cytokines.

Bronchiolitis is the most common viral infection of the lower respiratory tract, affecting babies in the first year of life. The highest rate of the disease is observed in children aged 3 to 9 months. The symptom complex of acute bronchiolitis includes obstruction of the lower respiratory tract, which occurs against the background of an acute respiratory viral infection (or when exposed to irritants) and is accompanied by symptoms of cough and respiratory failure: shortness of breath, tachypnea, tightening of the intercostal spaces. and/or hypochondria, swelling of the nasal wings, and bilateral wheezes in the lungs [2,10].

According to world statistics, the etiology of bronchiolitis in most cases is related to the respiratory syncytial (RS) virus. This virus is detected in 80% of sick children aged 3 to 12 months. More and more information is being gathered about the mainly viral nature of bronchiolitis, in which the RS virus takes the leading place with its wide spread and post-infectious immunity-building properties [5]. Other viral agents include parainfluenza viruses (type III) (10-30%), influenza (10-20%), adenoviruses (5-10%), M. Pneumoniae (5-15%), human metapneumoviruses (hMPV). more (9%),

rhinoviruses, coronaviruses and/or mixed infections [7]. RS virus infection accounts for 60% to 90% of children hospitalized for bronchiolitis in Europe [9].

Unfortunately, according to the literature, 80% of cases of bronchiolitis are considered pneumonia. X-ray changes in young children with bronchiolitis and pneumonia are similar, which contributes to the overdiagnosis of pneumonia and the unreasonable appointment of antibiotic therapy [1,3].

At the same time, the results of domestic and foreign studies on the characteristics of the clinical presentation of acute bronchiolitis in children do not allow creating a unified opinion about the course of the disease in modern conditions, because they are heterogeneous. data [9,11].

The severity of each link of the pathogenesis probably depends on the age of the child, the type of virus or their combination, the presence of atopy, environmental factors (climate, passive smoking), immunological reactivity and genetic predisposition [10,11]. There is no doubt that immunoregulatory mechanisms directly or indirectly affect the course of acute bronchiolitis in children and determine the severity of DN and prognosis. In bronchiolitis, cytokines play a leading role in regulating tissue homeostasis and intercellular interactions in lung tissue. Persistent inflammation in the bronchial tree is characterized by high levels of anti-inflammatory cytokines, interleukins IL-8, IL-1 $\beta$ , interferon INF $\alpha$  both in bronchial lavage fluid and blood serum, and by an imbalance in the protease/antiprotease system [4]. The body's immunity against viral infection is a complex process involving many cells, cytokines and mediators. Antiviral immunity, in the initial period of infection, is carried out due to the activation of cytotoxic CD8<sup>+</sup> lymphocytes by  $\alpha/\beta$ -interferon ( $\alpha/\beta$ -IFN), which interacts with fragments of viral proteins. Activated cytotoxic CD8<sup>+</sup> lymphocytes and NK cells are an important source of production of  $\gamma$ -interferon ( $\gamma$ -IFN), a key factor in antiviral defense [8]. The spread of respiratory viral infections, the cytokine response in these diseases, especially the role of cytokines in the formation of acute bronchiolitis, has not been well studied.

Although the diagnosis of bronchiolitis is a clinical procedure, some tests with the help of functional and immunological studies can provide information that will help in cases where the child can rely on further treatment.

The purpose of the study: to identify clinical, functional and immunological features of the course of acute bronchiolitis in children.

Material and research methods. The study group included 45 young children who were admitted with a diagnosis of acute bronchiolitis to the pulmonology department of the Republican Scientific and Practical Center for Pediatrics of the Ministry of Health of the Republic of Uzbekistan. The control group consisted of 20 practically healthy children of the same age.

The diagnosis was established on the basis of the classification of the main clinical forms of bronchopulmonary diseases in children, approved at a special meeting of the XVIII National Congress on Respiratory Diseases [6]. All patients underwent a comprehensive clinical examination taking into account complaints, anamnestic data, general clinical, laboratory and X-ray examinations of the chest organs and immunological studies.

Immunological studies were carried out at the Institute of Immunology and Human Genomics of the Academy of Sciences of the Republic of Uzbekistan. The concentration of cytokines: IL-4, IL-6, IFN $\alpha$  (and IFN $\gamma$ ) was determined by enzyme immunoassay using reagent kits manufactured by Cytokin LLC (Russia).

Statistical processing of the obtained results was carried out by a program developed in the Microsoft Office Excel-2010 package. Methods of variation statistics were used with the calculation of arithmetic mean values (M), their standard errors (m) and significant differences according to the Fisher-Student test.

Results of the study and their discussion. Among the examined children, boys accounted for 62.2%, and girls - 37.8%, in all cases there were more boys than girls. Among patients with acute bronchiolitis, children from 1 to 3 months were 73.3%, 3-6 months - 17.8%, from 6 to 12 months - 8.9%. At the time of hospitalization, the general condition of the patients was assessed as very severe in 4.4% of children, severe in 71.1% and moderate in 24.4% of children. The severity of the general condition was determined by the severity of clinical manifestations or complications.

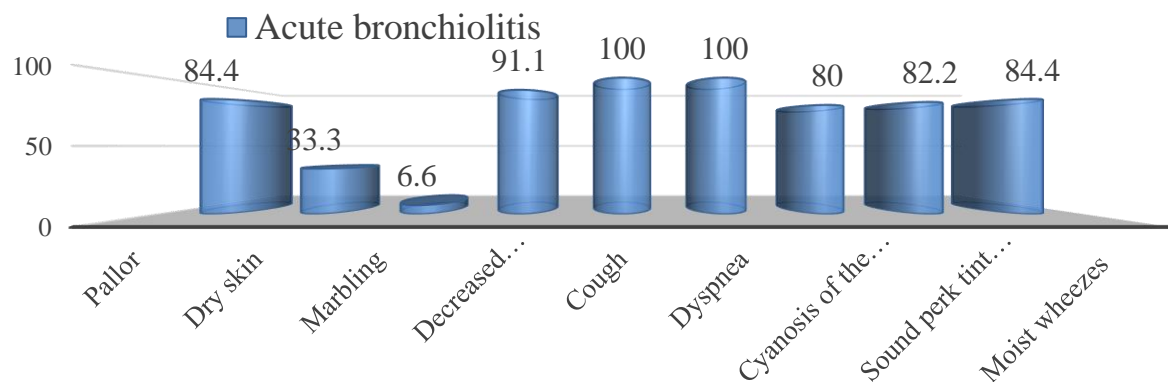
Analyzing the complete information on the anamnesis of the examined children, we identified the risk factors that were most common in them: prematurity was detected in 35.6% of cases, the factor of passive smoking in the family affects both the pregnant woman and the child in the group of children with acute bronchiolitis was significant indicators - 51.1% of cases.

The nature of the nutrition of children under the age of 1 year affects their growth and development in the future. Early transfer to artificial and mixed feeding leads to the development of background diseases (anemia, protein-energy deficiency, rickets, allergic diathesis), which not only reduce the resistance of the child's body, but also increase allergic sensitization. The examined children in 48.9% of cases were artificially fed, only 22.2% were natural-fed.

Acute bronchiolitis in children often proceeded against the background of concomitant pathology. When examining a child with bronchiolitis, comorbidities such as conjunctivitis, pharyngitis, and otitis media can be detected. Most often of the listed diseases in the examined patients, acute otitis media was detected in 22.2% of cases.

Upon admission to the hospital, the main complaints of parents of children with acute bronchiolitis were cough in 100.0%, shortness of breath in 100.0%, fever in 42.2% of children, loss of appetite in 91.1%, pallor - in 84.4%, dry skin - 33.3% and marbling - 6.6%.

A survey of children with acute bronchiolitis showed that the clinical symptoms correspond to the main manifestations of the disease. An analysis of the clinical manifestations of acute bronchiolitis showed (Pic. 1) that a temperature reaction of varying degrees was observed in 42.2% of children and was more often subfebrile, an increase in body temperature to 37 ° C was noted in 31.6% of cases, in 68.4% of children – up to 37-38°C



Picture 1. Frequency of occurrence of clinical manifestations in patients observed during admission, (%).

The duration of temperature in observed children was determined by the severity of intoxication. Cough, one of the characteristic symptoms of children with acute bronchiolitis, was mainly wet in 86.7% of cases. Signs of respiratory failure in the form of cyanosis of the nasolabial triangle in 80.0%, increased exhalation, tachypnea with the clear participation of auxiliary muscles in the act of breathing - 95.5%, swelling of the nasal wings in 42.2%. circumstances.

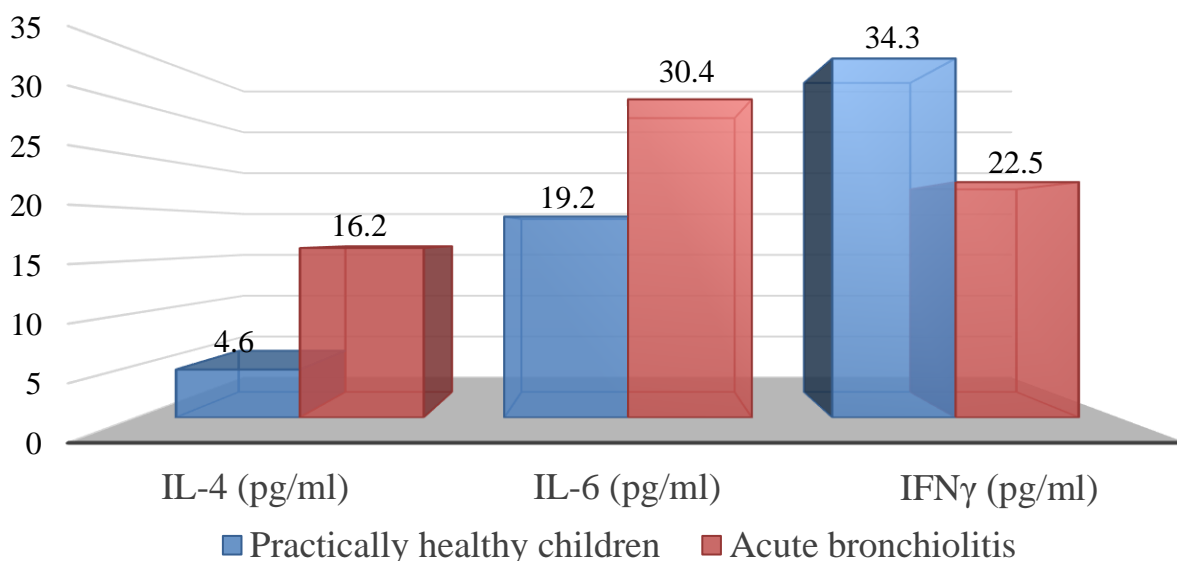
Percussion identified the box tone of the sound in 82.2% of children. During auscultation in children with acute bronchiolitis, hard breathing was detected in 86.7% of cases, and weakened breathing in 13.3% of cases. Basically, in 84.4% of patients with acute bronchiolitis, sometimes accompanied by crepitus, a rash with small moist bubbles was heard.

In patients with acute bronchiolitis, chest X-rays often revealed areas of lung expansion, increased bronchopulmonary pattern, and decreased transparency of lung tissue.

A positive result of a rapid test or polymerase chain reaction test for RS virus in most cases confirms its etiological role in the development of bronchiolitis [10]. RS-virus is the leader in the etiological structure of acute bronchiolitis in the examined children and was detected in 60.0% of patients. In children with bronchiolitis, detection of RS-virus infection in an isolated form and in combination with bacterial infection is a prognosis of a severe course of the disease and is directly related to severe forms of bronchial obstructive syndrome. Identifying the causative virus in hospitalized patients can help prevent nosocomial infection by differentiating sick children and caregivers based on the causative virus type.

Anemia was observed in 51.1% of children in peripheral blood, leukopenia was detected in 17.8% of patients with slightly increased ESR. In 31.1% of children, lymphocytosis was noted against the background of a normal number of leukocytes.

The results of the cytokine profile study are shown in Figure 1. As can be seen from the figure, the IL-4 production index in children with acute bronchiolitis increased to  $16.2 \pm 1.4$  pg/ml and exceeded the standard. 3.5 times the norm ( $p < 0.001$ ).



Pic.2. Parameters of cytokines in children with acute bronchiolitis, ( $M \pm m$ ) In acute bronchiolitis in children, an increase in the amount of IL-6 was registered - up to  $30.4 \pm 2.8$  pg/ml, compared with the control -  $19.2 \pm 2.4$  pg/ml ( $p < 0.01$ ). In children with acute bronchiolitis, serum IFN $\gamma$  values were

significantly lower by 1.5 times ( $22.5 \pm 2.3$  pg/ml) compared with the control group ( $p < 0.01$ ). The obtained results are consistent with the literature data that an increase in the concentration of IL-4, IL-6 is recorded in children with acute bronchiolitis, but there is no increase in IFN $\gamma$ .

Thus, in children with acute bronchiolitis, children of the first three months of life are more likely to suffer, risk factors are children born before the gestational age, passive smoking, who are bottle-fed, and occur against the background of concomitant pathology. The revealed imbalance of the cytokine profile - an increase in the concentration of cytokines IL-4, IL-6 and a decrease in the production of IFN $\gamma$ , may predispose to the formation of hyperreactivity of the tracheobronchial tree in children with acute bronchiolitis.

### Conclusions:

1. In children with acute bronchiolitis, characteristic clinical manifestations are determined, the leading etiological agents are respiratory syncytial virus, which is important to consider in clinical practice.
2. In acute bronchiolitis in children, an increase in the concentration of cytokines IL-4, IL-6 and a decrease in the production of IFN $\gamma$  are determined. The revealed imbalance of the cytokine profile may predispose to the formation of hyperreactivity of the tracheobronchial tree in children with acute bronchiolitis.

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