IMMUNOLOGICAL CHARACTERISTICS OF DISEASES OF THE BRONCHOPULMONARY SYSTEM IN INFANT CHILDREN IN THE ARAL SEA REGION

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Abstract. *Identified changes in the immune status of children with bronchopulmonary pathology living in an unfavorable environmental environment; children with pneumonia and obstructive bronchitis had high levels of immunoglobulin Ig E and low levels of sIgA. Interleukin IL-4 in pneumonia had higher values than the reference value of 60%, in obstructive bronchitis 90%, this indicates a change in both cellular and humoral immune imbalance, which subsequently leads to more severe diseases of the bronchopulmonary system.*
Keywords: *children, early age, weight, height, bronchopulmonary pathology*

Relevance. Respiratory diseases do not lose their relevance despite the use of high-tech diagnostic methods for treatment and prognosis in children of all ages and adults. Climate change in the Aral Sea region due to the drying of the Aral Sea has led to global death and changes in the fauna, natural resources, which affects the health of the adult and child population. One of the most common pathologies in childhood is the diseases of the bronchopulmonary system. The high growth of pneumonia and bronchitis largely depends on environmental and biomedical factors, such as habitat, air, soil and water, as well as on the nutrition of mother and child, on diseases and bad habits of parents. Social, hygienic and economic factors have an important influence on the health, growth and development of children in this region. [5,6,9]. The influence of the environment, nutrition and various other factors on the immune system of children and adults is of fundamental importance in the adaptation of the body [1-3,6,7]. The child's body is more sensitive to the negative factors of the internal and external environment, since the normal functioning of the immune system quite effectively puts a "ban" on the development of many diseases, and the insufficiency of the body's immune responses leads to various infectious and inflammatory diseases [1-3,11]. Local immunity in the body is formed due to the secretory immunoglobulin of group A. The main function of IgA is the timely protection of the body from infectious agents on the mucous membranes of the body, and this prevents the penetration of viruses. IgA does not interact with the complement system and does not have bactericidal properties, but takes part in the neutralization of bacterial toxins [6,11]. In this regard, there is a rapid growth of immune-dependent diseases, the prevalence of chronic pathological processes that develop against the background of impaired adaptation of the immune system, and an increase in the number of background diseases. [2,5,7]. Key cytokines in the development and maintenance of airway inflammation are mediators such as interleukin-8 (IL-8), tumor necrosis factor α (TNFα) and interleukin-6 (IL-6). Cytokines are protein mediators that are synthesized by various immune cells such as lymphocytes, monocytes, granulocytes, endothelial cells and others; they are synthesized in response to the introduction of pathogens into the body, primarily viruses, bacteria, and toxins. Cytokines have a wide range of biological activities and contribute to intercellular

interactions during the immune and inflammatory process. They function as mediators of the immune system, regulate the strength and duration of the immune response, and determine the type and intensity of the inflammatory process [2, 6,11].

Target research. Study of the immunological reactivity of bronchopulmonary diseases in young children living in the Aral Sea region.

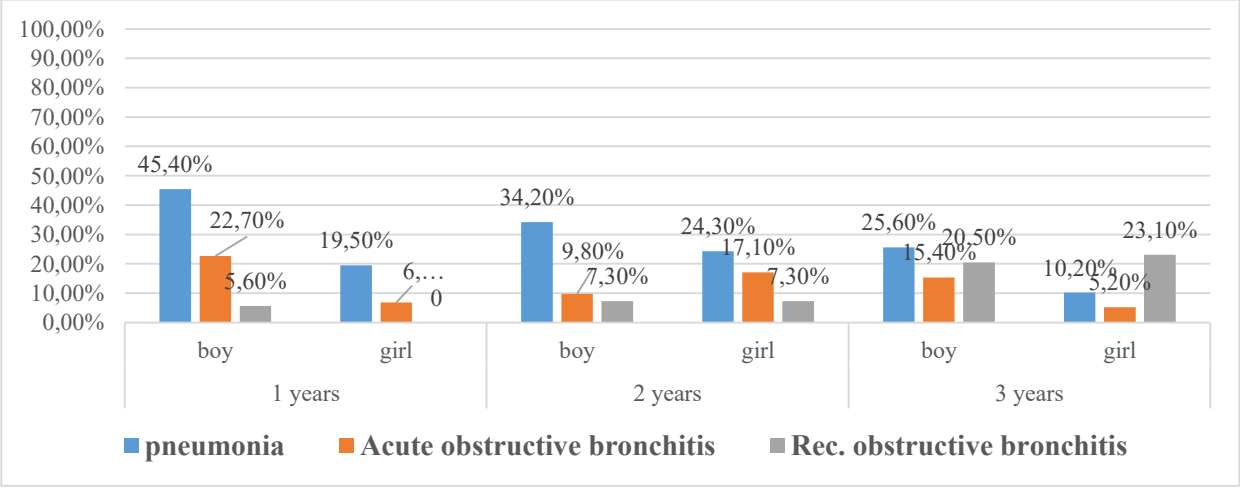
Materials and methods. We examined 168 children of early age living in the Khorezm region with respiratory diseases. The following methods were used to examine children: clinical and anamnestic, assessment of external minor developmental anomalies, survey of parents, analysis of data from primary medical documents.

Immunological studies were carried out on a main group of 40 children in the Khorezm region and on a control group of 20 children of the same age in Tashkent with respiratory pathologies. Immunological studies were carried out at the Institute of Immunology of the Academy of Sciences of Uzbekistan (head of the laboratory - professor, doctor of biological sciences D.A.Musakhodzhaeva). The content of secretory IgA in saliva and IgE in blood serum was determined according to Manchini. The concentration of cytokines: interleukin- 4(IL-4) , 8(IL-8) was determined in saliva by enzyme immunoassay using reagent kits manufactured by Cytokin LLC (St. head of the laboratory - D.A. Musakhodzhaeva , Doctor of Biological Sciences). Statistical processing of the obtained results was carried out using application programs for statistical data processing Statistica ® version 6.0. The significance of differences between the compared groups was assessed by criterias Studentas t-test. Differences in the compared values were recognized as statistically significant at $p< 0.05$.

Results and their discussions: The work is based on the results of a survey conducted in the regional multidisciplinary children's hospital in Urgench in children aged 1-3 years. The structure of pathology for bronchopulmonary diseases showed that recurrent obstructive bronchitis in children 1 year of age was 12.4%, acute obstructive bronchitis 29.5% and acute pneumonia was observed in 64.9%, which coincides with literature data, from 2 years of age acute obstructive bronchitis 26.9%, recurrent obstructive bronchitis 14.6%, and acute pneumonia 58.5%; according to our studies, recurrent obstructive bronchitis 43.6% was more common in 3-year-old children (Picture 1).

Picture No. 1

Distribution of children by sex and pathologies



Of the total number of children, a high incidence of concomitant pathology was in patients of the first year of life, which amounted to: PCNS 23.9%, atopic dermatitis 27.9%, dysmetabolic nephropathy 55.7%, rickets 17%. The analysis of the rest of the children in the age groups showed comorbid pathologies: dysmetabolic nephropathy 39.8%, atopic dermatitis 27.9%, rickets 18.4%, PCNS 12.5%. When studying the clinical course of diseases, the main complaints in children of 1 year of age, mainly from the words of the mother, were an increase in body temperature t 38-39, which amounted to 85%, cough 100% and weakness -35%. At the same time, in 45 children 2-3 years of age, a prolonged cough that lasted 4 weeks or more, with sputum production, was 34.6%. In 30% of patients firs year of life during physical exertion (with anxiety, during feeding), cyanosis of the nasolabial triangle was observed. On examination, 24.6% of patients showed swelling of the wings of the nose and the participation of auxiliary muscles in the act of breathing, and 57.6% of children had rapid breathing. In children of all age groups, the most common form of dyspnea was mixed - 26.3%, expiratory dyspnea - 22.7%, inspiratory dyspnea - 7%. In turn, in children of 1 year of age, expiratory dyspnea occurred in 17.4% of cases, which indicates the course of an obstructive syndrome in pneumonia, a mixed form of dyspnea was 11.0%, inspiratory dyspnea occurred in 22.2% of cases, and in children 3 years old often there was a mixed form of shortness of breath 10.0%.

The conducted immunological studies showed the content of total IgE in the blood serum of the main group of young children significantly increased and amounted to 70.16±26.21 IU/ml, and in children of the control group this figure was 61.85±20.36 IU/ml ($p < 0.005$). In the main group with obstructive bronchitis in children, high levels of IgE were observed and amounted to - 81.8%, in 18.2% the level of IgE was in the reference values, and in pneumonia, a high level of IgE was in 10.5%, these children have a history of comorbidity as an obstructive syndrome. In children of the control group, 80.0% of the IgE level was increased, and in children with pneumonia, this figure was 40%, this is due to the fact that the children had a history of allergic pathologies.

According to the literature, the level of sIgA is of great importance in predicting the morbidity of the population during large-scale clinical examination of the population [Ivanov V.D. et al ., 2006]. In turn, one can also assess whether local immunity—a decrease in sIg A indicates a lack of local immune function, and a high amount indicates an imbalance in the immune system [Makovetskaya A.K., 2005]. In our study, the results of the level of secretory sIgA in the salivary fluid in children of the main group showed 38.32±4.91, respectively, in the control group 45.10±4.11 ($p< 0.005$). Following the above, secretory immunoglobulin A- sIgA main local immunity and provides protection to all parts of the respiratory tract. The level of secretory immunoglobulin sIgA of the human body changes depending on his age, environmental factors and morbidity, and it must be taken into account that with age the level of secretory immunoglobulin class A decreases. The level of sIgA in the study groups of the Khorezm region and Tashkent city, the average value decreased, in turn, the indicator in the main group was lower (38.32 ± 4.91, respectively 45.10 ± 4.11). As a percentage in our study, in children of the main and control groups in terms of incidence, with pneumonia in both groups the level of sIgA was 100% reduced in children, and with obstructive bronchitis in patients it was 81.7% sIgA was reduced in the main group and in the rest children in this group with obstructive bronchitis was 9.3% reference value. In the control group, TMR was reduced in 100% of sIgA . We studied interleukins of the pro-inflammatory (IL-8) and anti-inflammatory (IL-4) class in saliva, in turn, interleukins in the

immune and inflammatory response are of great importance in various areas of medicine and modern immunology, regulating specific immune reactions and limiting the development of inflammation. Among proinflammatory cytokines, IL-4 is considered the most important mediator in the development of inflammation. Indicators of cytokine status in children early age - children of the main group - IL-4 21.20±6.37, control group 9.22±1.66, and in the context of nosological groups showed that the level of IL-4 in pneumonia had high values than the reference value of 60%, for obstructive bronchitis 90%, and in the control for pneumonia the reference value of interleukin IL-4 does not change. In studies examining the level of IL-8 in saliva in young children, the main group showed 65.83±43.74 (Table No. 1).

Table No. 1.

Some indicators of immune status in children early age group

		IgE	SIgA	IL-4	IL-8
Main group	Obstructive bronchitis	105.95±29.78	53.79±24.32	18.08±7.11*	28.67±29.76
	Pneumonia	35.74±15.11*	39.96±5.39*	17.93±7.63	71.63±43.06
Control group	Obstructive bronchitis	68.00±35.96*	45.11±7.43*	10.37±1.64	62.94±7.38*
	Pneumonia	45.11±18.68	31.91±18.50*	4.95±2.61	81.19±55.05

Note: *significance $p < 0.05$

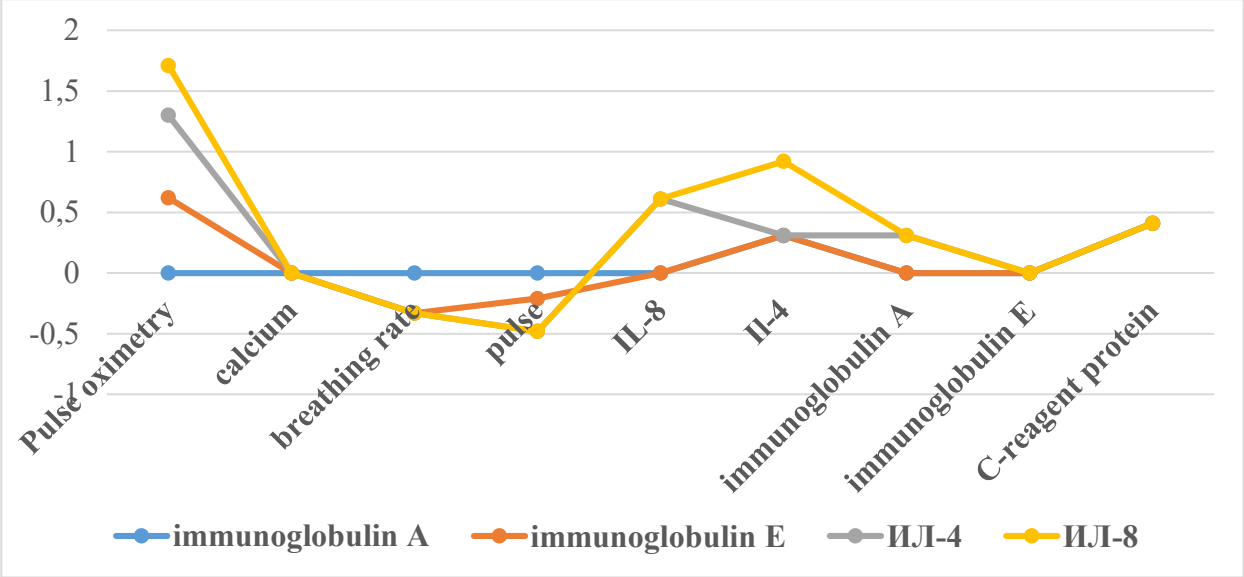
In the control group 79.32±27.69, and the level of IL-8 in pneumonia had higher values than the reference value by 35%, in obstructive bronchitis 9%, in other cases there is a reduced value, and in the control groups of obstructive bronchitis IL -4 and IL-8 were respectively increased in 60%, and in pneumonia, the value of interleukin IL-4 was increased in 100% of the children studied. Identified changes in the immune status of children with bronchopulmonary pathology living in not favorable environment with pneumonia and obstructive bronchitis were high levels of immunoglobulin Ig E and low levels of sIgA. Interleukin IL-4 in pneumonia had higher values than the reference value of 60%, in obstructive bronchitis 90%, this indicates a change in both cellular and humoral immune imbalance, which subsequently leads to more severe diseases of the bronchopulmonary system. Our indicators coincide with the indicators of the level of interleukin IL-4 and IL-8 according to the literature, which means that when one indicator increases, the other indicator decreases. Analysis of the correlation between secretory immunoglobulin sIgA showed a moderate association with nterleukin IL -4 (r=0.31) and C-reactive protein (r=0.41), and immunoglobulin IgE was strongly associated with pulse oximetry (r=0.62) and an average negative relationship with respiratory rate (r = - 0.33). Interleukins- IL -4 was highly correlated with pulse oximetry (r =0.68) and IL - 8 (r=0.61). IL -8 average is correlated with pulse oximetry (r =0.41) (Picture 2).

A study of the immune status showed that the pro-inflammatory cytokines-interleukin IL-4 is an important mediator of the development of inflammation. The level of IL-4 in pneumonia was higher than the reference value of 60%, in obstructive bronchitis 90%, and in the control group with pneumonia, the reference value of interleukin IL-4 does not change. It is important to note that the identified changes in the humoral status in young children with bronchopulmonary pathology, living in an unfavorable environmental environment, namely with pneumonia and obstructive bronchitis, had high levels of immunoglobulin IgE and low levels of sIgA. Based on

the foregoing, this indicates changes and imbalances in some immunological parameters, which further leads to more severe diseases of the bronchopulmonary system. Summing up in our study, the inclusion of a diagnostic protocol for all bronchopulmonary diseases of immunoglobulin IgE is extremely important.

Picture No.2

These correlations in young children



Conclusion. Thus, in children of the first year of life, the incidence of pneumonia was 64.9%, and in 2-year-olds it was 58.5%. Recurrent obstructive bronchitis was more common in children aged 3 years - 43.6%. An analysis of the incidence of concomitant diseases showed that dismetabolic nephropathy 39.8%, atopic dermatitis 27.9%, rickets 18.4%, PPCNSL 12.5%, contributes to the protracted and recurrent course of the main pathology of this region. Identified changes in the immune status of children with bronchopulmonary pathology living in an unfavorable environmental environment; children with pneumonia and obstructive bronchitis had high levels of immunoglobulin Ig E and low levels of sIgA. Interleukin IL-4 in pneumonia had higher values than the reference value of 60%, in obstructive bronchitis 90%, this indicates a change in both cellular and humoral immune imbalance, which subsequently leads to more severe diseases of the bronchopulmonary system. To summarize, in our study, the inclusion of a diagnostic protocol for immunoglobulin Ig E is extremely important.

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