

# INDICATORS OF CELLULAR AND HUMORAL IMMUNITY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN CHILDREN

Ibatova Sh.M.

Mamatkulova F. Kh.

Sanakulov A. B.

Samarkand State Medical University, Samarkand, Uzbekistan

## Abstract

Chronic obstructive pulmonary disease is a common lung disease that is accompanied by cough, sometimes with sputum, difficulty breathing, wheezing and fatigue. In the development of chronic obstructive pulmonary disease in children, the premorbid background and the state of general reactivity of the body play an important role. The aim of the study was to study the state of immunity in children with chronic obstructive pulmonary disease. We examined 100 children who were inpatients in the children's department of the clinic of SamMI No. 1 from 2011-2018. Group I consisted of 30 patients aged 3-7 years, group II - 70 patients aged 8-15 years. The studies confirm the significant pathogenetic significance of immunological deficiency on the course of chronic obstructive pulmonary disease in children and indicate the need for its correction.

**Keywords:** chronic obstructive pulmonary disease, children, cellular and humoral immunity, immunological deficiency.

## Introduction

Chronic obstructive pulmonary disease (COPD) is a common lung disease that causes limited airflow in the airways and makes breathing difficult. COPD can affect the lungs and lead to their clogging with sputum. Symptoms of the disease include cough, sometimes with sputum, difficulty breathing, wheezing, and fatigue. In the development of chronic obstructive pulmonary disease in children, the premorbid background and the state of general reactivity of the body play an important role. Among the endogenous factors that determine the probability of developing this disease, immunological processes are of great importance [1,3,5,7,8,11].

The course and outcome of the chronic inflammatory process in the lungs largely depend on the state of immunological reactivity.

The study of the state of immunity in this pathology in children began a long time ago. At present, immunological shifts in chronic bronchopulmonary diseases have been studied sufficiently in the works [2,4,6,9,10]. Despite the conflicting data on immunity indicators, we can already talk about the practical significance of these studies for the correction and monitoring of treatment effectiveness. The use of various means aimed at improving immunity significantly increases the effectiveness of treatment.



**PURPOSE OF THE STUDY**

To study the state of immunity in children with chronic obstructive pulmonary disease.

**MATERIAL AND METHODS OF RESEARCH**

A total of 100 children with chronic obstructive pulmonary disease who were hospitalized in the children's department of the SamMI No. 1 clinic from 2011 to 2018 were examined. Group I consisted of 30 patients aged 3-7 years (24 patients with bronchial deformation; 6 with bronchiectasis), group II consisted of 70 patients aged 8-15 years (46 patients with bronchial deformation; 24 with bronchiectasis). The first and second level tests were examined: lymphocyte isolation according to Boum (1974) on a Ficcol-Verografin gradient with a density of 1.077 g / cm. The number of circulating T-lymphocytes was estimated by the spontaneous rosette formation method according to Jondal et.al., (1972). Determination of immunoregulatory subpopulations of T-lymphocytes, T-suppressors, T-helpers and B-rosette-forming lymphocytes (in reaction with mouse erythrocytes) was carried out according to I.V. Ponyakina and K.A. Lebedev, (181).

For quantitative registration of antigen-binding lymphocytes (ABL) circulating in peripheral blood, we used the indirect rosette formation method proposed by F.Yu. Garib, (1988). The content of the main classes of immunoglobulins A, M, G in the blood serum by the radial diffusion method in agar according to Manchini et.al., (1965).

Determination of the level of CIC in the blood serum was carried out using a standard test system. Phagocytic activity of neutrophils was assessed by the generally accepted method with a suspension of staphylococcus. The diagnosis of chronic obstructive pulmonary disease was verified based on a thorough collection of the child's life history and disease history, clinical, bacteriological, immunological, radiological data, and, as indicated, bronchoscopic and functional research methods.

**RESEARCH RESULTS AND THEIR DISCUSSION**

The studies showed that patients with this pathology differed significantly from healthy children in terms of immunological reactivity. We studied immunity indicators upon admission of patients in the acute phase of the disease, upon discharge from the hospital, and in 56 patients in the follow-up period.

The results of immunological studies depending on the age of the patients are presented in Table 1.

**Table 1. Cellular immunity indices, FAN, ASL and CIC in children with chronic obstructive pulmonary disease upon admission in the acute phase (M±m)**

Indicators	Healthy children		Children with chronic obstructive pulmonary disease	
	3 - 7 years	8- 15 years	3- 7 years	8 -15 years
T-lymph.,%	59,1±1,03	58,1±1,18	42,94±1,31 P<0,001	40,7±1,2 P<0,001
T-abs.thousands/μl	1,84±0,11	1,51±0,13	1,26±0,1 P<0,01	1,17±0,06 P<0,05
T-help.,%	43,9±0,69	46,1±0,93	33,97±0,94 P<0,001	33,93±0,83 P<0,001



T-suppress, %	7,8±0,41	8,2±0,63	5,87±0,45 P<0,05	5,8±0,32 P<0,05
B-lymph., %	11,6±1,29	12,3±0,99	10,56±0,56 P>0,1	9,95±0,48 P<0,05
abs.thousands/μl	0,36±0,04	0,3±0,05	0,39±0,03 P>0,1	0,31±0,02 P>0,1
Phagocytosis, %	55,6±0,76	58,4±1,21	42,52±1,19 P<0,001	41,24±0,96 P<0,001
abs.thousands/μl	2,3±0,15	2,35±0,13	2,01±0,12 P>0,1	1,96±0,1 P<0,01
ASL, %	1,0±0,08	1,0±0,08	4,2±0,09 P<0,001	5,86±0,11 P<0,001
CIC %	94,5±1,0	96,8±1,2	149,2±9,17 P<0,001	177,9±8,42 P<0,05

Note: P—reliability of the difference between the indicators of healthy children and children with chronic obstructive pulmonary disease.

A significant decrease in the relative number of T lymphocytes was found in all age groups 42.94±1.31% (P<0.001); 40.7±1.2% (P<0.001) compared to the control group 59.1±1.03%; 58.1±1.18%, and the absolute number of T lymphocytes changed accordingly P<0.05. A significant decrease in T helpers 33.97±0.94% (P<0.001); 33.93±0.83% (P<0.001); and T suppressors 5.87±0.45% (P<0.05); 5.8±0.32% (P<0.05) in the acute stage of the disease was also noted. When studying the content of B-lymphocytes, a reliable decrease in the relative content in children aged 8 to 15 years was revealed 9.95 ± 0.48 P < 0.05, with no reliable shifts at the age of 3-7 years (P > 0.05). When analyzing the absolute number of B lymphocytes, no reliable deviation from the norm was found in any patients (P > 0.1).

Analysis of the results of the study of serum immunoglobulins showed that most children 54 (77.1%) aged 8-15 years had an increase in the level of immunoglobulins of all classes (P < 0.05), which is a normal reaction to prolonged irritation, in the remaining 16 patients in 22.9% of cases there was some decrease in Ig A (P > 0.1), IgM (P > 0.1) and a reliable increase in IgG (P < 0.05). The level of immunoglobulins A, M, G at the age of 3-7 years did not differ significantly from the control group of healthy children, however, in 27% of patients the content of IgG was significantly increased (P<0.001).

The indicators of humoral immunity in chronic obstructive pulmonary disease in children depending on age are presented in Table 2.

**Table 2. Humoral immunity indices in children with chronic obstructive pulmonary disease (M±m)**

Indicators	Healthy children		Children with chronic obstructive pulmonary disease	
	3 - 7 years	8- 15 years	3- 7 years	8 -15 years
IgA, g/l	0,81±0,04	1,18±0,09	1,1±0,07 P>0,1	1,67±0,07 P<0,05
IgM, g/l	0,86±0,06	1,01±0,13	0,94±0,06 P>0,1	1,29±0,06 P<0,02
IgG, g/l	9,35±0,27	9,03±0,56	10,85±0,18 P<0,001	10,92±0,16 P<0,001



Note: P—reliability of the difference between the indicators of healthy children and children with chronic obstructive pulmonary disease.

The presented data on the state of humoral immunity can be explained by the consequence of a long-term inflammatory process, about the constant tension of the humoral immunity system. All this indicates the mobilization of the body's defenses mainly by the humoral route, which is not effective enough, since there is a decrease in cellular immunity, which should be taken into account when prescribing a complex of therapeutic effects.

A reliable increase in immunoglobulins in 77.1% of patients aged 8-15 years indicates that the longer the disease lasted, the more immunoglobulins increased. This can be assumed by the greater maturity of the immunogenesis apparatus in patients aged 8-15 years than in those aged 3-7 years. A reliable increase in IgG in all groups of patients indicates that organic damage to bronchopulmonary tissue is accompanied by sensitization.

We studied the state of the antigen-specific link of the immune system by identifying antigen-binding lymphocytes (ABL) sensitized to lung tissue antigens. The results of the study showed that in chronic obstructive pulmonary disease, a pronounced immune reaction develops with an increase of  $5.86 \pm 0.11\%$  in the blood content of ASL to the pulmonary antigen in children aged 8-15 years and  $4.2 \pm 0.09\%$  at the age of 3-7 years compared to the group of healthy children  $1.0 \pm 0.08$  ( $P < 0.001$ ). Under conditions of a nonequivalent ratio of antigen and produced antibodies, prerequisites are created for the formation of organ fixation of CIC with the implementation of their pathogenetic effect on target organs [10]. As can be seen from the data presented in Table 1, in patients in the exacerbation phase, the concentration of CIC was significantly increased in all age groups ( $P < 0.001 < 0.05$ ).

The revealed increase in CIC is apparently associated with constitutionally altered or acquired immunological reactivity. When studying the immunity indices, we noted a more pronounced decrease in T- and B-cell immunity in patients with bronchiectasis and severe condition with pulmonary heart failure ( $P < 0.05$ ), compared with patients with bronchial deformation and moderate condition.

The content of immunoglobulins A, M, G was also high, both in comparison with the norm ( $P < 0.05$ ) and in comparison, with the indices of patients with bronchial deformation and moderate condition ( $P < 0.05$ ).

## CONCLUSION

Thus, the conducted studies confirm the significant pathogenetic significance of immunological deficiency on the course of chronic obstructive pulmonary disease in children and indicate the need for its correction.

## REFERENCES

1. Ageikin V.A. Chronic bronchopulmonary diseases in children. // Medical scientific and educational-methodical journal, No. 24, 2005, pp. 7-31.
2. Azizova N.D. Prevalence and structure of chronic pneumonia in children of the Khorezm region. // The study of the human health situation in the Republic of Uzbekistan. Tashkent, 2003, pp. 98-101.



3. Ataullakhanov R.I., Ginzburg A.L. Immunity and infection: dynamic confrontation of living systems. // Pediatrics, No. 4, 2005, pp. 47-61.
4. Asadova G.U. Cardiointervalogical diagnostics and treatment of chronic bronchopulmonary diseases in children. // The importance of psychological status in the formation of chronic bronchopulmonary process in children. // Materials of the Republic of Uzbekistan. Tashkent, 2003. pp. 101-103.
5. Garib F.Yu. Immunodependence of diseases and principles of immunocorrection // Journal of Infection, Immunity and Pharmacology. Tashkent. 2002. No. 1-2. pp. 22-27.
6. Dzhubatova R.S., Umarova Z.S., Gulyamov R.O. et al. The importance of psychological status in the formation of chronic bronchopulmonary process in children. // Materials of the Russian Academy of Sciences. 13th National Congress on Respiratory Diseases: Abstract of reports. Moscow. -2003. p. 65.
7. Ibatova Sh. M. Mamatkulova F. Kh. Immune status of children with chronic obstructive pulmonary disease. American Journal of Pedagogical and Educational Research ISSN (E): 2832-9791| Volume 24, | May – 2024. P.57-62.
8. Kaganov S.Yu. Modern problems of pediatric pulmonology.//Russian Bulletin of Perinatology and Pediatrics. Moscow. 2003, No. 3. p. 9-16.
9. Liverko I.V. Chronic obstructive pulmonary disease. Tashkent, 2005.
10. Rachinsky S.V., Tatochenko V.K., Volkov I.K. The place of chronic pneumonia and chronic bronchitis in bronchopulmonary pathology in children. // Pediatrics, No. 1, 2004, pp. 58-62.
11. Chuchalin A.G. Chronic obstructive pulmonary diseases. Moscow: Binom, 2000. pp. 306-307.

