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FEATURES OF IMMUNOREACTIVITY CHILDREN WITH ALLERGIC DISEASES IN DIFFERENT AREAS OF THE JIZZAKH REGION OF Ruz

Nematova H. G.
Tashkent Pediatric Medical Institute, Tashkent, Uzbekistan

Abstract
An immunological examination was carried out on 110 children aged 7 to 14 years with AR, BA, AD, living in 3 districts of the Jizzakh region. The data obtained on the nature of immunological disorders in children with allergic diseases make it possible to determine the characteristics of the impact of climatic, environmental and industrial factors on the immune system.

Keywords: allergic diseases, children, immunological status, environmental factors.

Introduction

Atopic diseases are one of the most common chronic allergic diseases, socially significant for both children and adults. Over the past 20 years, the prevalence of atopy has increased significantly, especially among children [1]. The leading role among IgE-dependent diseases, in addition to allergic rhinitis and atopic dermatitis, belongs to atopic bronchial asthma, which represents a serious social problem due to its high prevalence, severe clinical course, as well as early disability and risk of death.

The need to study the impact of environmental factors on humans is constantly increasing due to the changing environmental and industrial conditions. Due to the intensive development of various industries, a significant number of people are and will be exposed to chronic exposure to production factors [2,5]. This acutely poses the problem of studying clinical manifestations caused by the influence of a complex of industrial, agricultural and other harmful factors on the population living in the area of their activity.

The immune system reacts subtly even to small concentrations of chemical agents, to small doses of electromagnetic and ionizing radiation, to stress, the development of functional changes that can develop into persistent immune disorders, manifested by the growth of infectious diseases, allergic, autoimmune and proliferative diseases [3,4]. The picture and mechanisms of the development of the dysfunction of the immune system in the child population of the Jizzakh region have not yet been fully studied. There are no data on the formation of immunological disorders in children with isolated and combined effects of production factors, the effect on the immune system of living conditions has not been studied. There is also no generalized information about the interdependence of clinical manifestations of immune deficiency with each other and with chronic somatic pathology in the inhabitants of this region. At the same time, the prevention of undesirable effects is

based on the analysis of violations of various body systems, especially the immune system due to its integrating value in maintaining homeostaea and high sensitivity. The foregoing indicates the high relevance of work on the assessment of the immunological status of children with allergic diseases living in various regions of this region (industrial, agricultural, foothill). Despite a number of studies conducted on the study of immunological mechanisms of allergic diseases in children, the immunological mechanisms of allergic diseases under the influence of various environmental factors are still not completely clear and require further research. purpose of the study. Therefore, the purpose of this stage of our study was to study the features of the immunoreactivity of children, with allergic rhinitis (AR), bronchial asthma (BA), atopic dermatitis (ATD), living in 3 different in terms of climatic, environmental and industrial conditions in the regions of the Jizzakh region.

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Table 1. Distribution of children depending on the type of allergic disease and place of residence

City/ District	Nosological units			TOTAL
	AR	BA	AtD	
Jizzax city	21(19,0)	19(17,2)	17(15,4)	57(51,8)
Forish district	13(11,8)	12(10,9)	11(10,0)	36(32,7)
Mirzacho'l district	7(6,3)	6(5,4)	4(3,6)	17(15,4)
Total	41(37,2)	37(33,6)	32(29,0)	110(100)

Given the general atopic nature of the allergic diseases in question, we decided to divide them into groups only depending on the region of residence and age of patients. Analysis of the total number of leukocytes showed moderate leukocytosis in all groups of examined patients. Significant differences ($p<0.05$) with the control group (6308 ± 0.8 μL) This figure was in 1 and 2 groups of patients (10974±183.1 μL and 9837±833.6 μL, respectively) (Table 4.2). In the study of immunoregulatory lymphocyte subpopulations, an imbalance was found in the subpopulation composition of T-lymphocytes. It is known that CD4+ lymphocytes, that is, T-helpers play a leading role in the cytokine cascade when the immune response to the infiltrated antigen is turned on. Significant suppression ($p<0.05$) of expression of marker receptors of T-helpers was observed in the 2nd group of patients (25.2±1.5%), which is lower than in group 1 or 3 and in the control group, which indicates functional the failure of this link in the immune system. The absolute number of CD4+ cells were significantly increased in the 2nd and 3rd group compared to the control data (Tab.2).

Table 2. Indicators of the cellular link of the immune system of children 4-6 years old with allergic diseases living in various regions of the Jizzakh region

Indicators	Control group	Study groups		
		1 group	2 group	3 group
Leukocytes, μl	6308 ± 0,8	10974±183,1*	9837±833,6*	7565±610,2
Lymphocytes, %	35,9± 2,9	47,9±1,9*	46,7±3,2*	41,3±1,6
Lymph., μl	2150,7±237,5	3854±118,9*	3947±118,3*	2835±117,2
CD3+, %	58,9 ± 2,05	56,7±2,1	49,7±1,8*	52,0±1,9
CD3+, μl	1359,6±214,5	1895±93,1*	1689,5±51,4	1536±52,9
CD 4+, %	33,6 ± 2,2	32,9±1,5	25,2±1,5*	27,4±1,2
CD4+, μl	686,1± 159,3	979±40,2	1309,1±127,1*	1087,2±99,4*
CD8+, %	23,3 ± 1,1	31,8±1,3*	24,2±1,8	23,9±1,9
CD8+, μl	443,6 ±68,7	878,5±81,5*	853,2±93,6*	813,1±87,3*
IRI	1,5 ± 0,1	1,05±0,1*	1,1±0,09*	1,3±0,07
CD16+, %	12,9 ± 0,6	15,9±1,2	16,1±1,3	12,6±0,5
CD20+, %	22,6 ± 2,84	26,9±0,8	24,1±1,1	21,8±0,6
CD20+,	642,6± 66,4	876,1±34,8*	834,2±42,7	812,1±43,7
CD23+, %	28,1 ± 1,2	31,1±0,9	24,9±0,8	21,9±0,5*
CD38+ , %	24,0 ± 1,7	32,9±2,7*	28,2±2,0	26,8±1,7
CD95+,%	25,1 ± 2,9	29,8±1,4	24,9±1,1	22,4±1,2

Note: * - reliability of data between groups (P<0,05)

Another major subpopulation of T-lymphocytes is cytotoxic lymphocytes with CD8+ surface receptors; their increase was noted in patients in the study groups.

Thus, if in the group of healthy donors their number was 23.3 ± 1.1%, then in the 1st study group of patients it was 31.8 ± 1.3% ($P < 0.05$).

The absolute values of the number of CD8+ cells also differed significantly in children with allergy pathology compared to the control group ($P<0.05$).

Thus, in group 1, the number of CD8+ cells was 1.9 times higher, in group 2 – 1.8 times, in group 3 – 1.7 times.

The results obtained may indicate the presence of a fairly high proportion of suppressor cells in the studied population, since the CD8+ population is heterogeneous; this receptor is expressed not only by cytotoxic cells, but also by cells with suppressor functions.

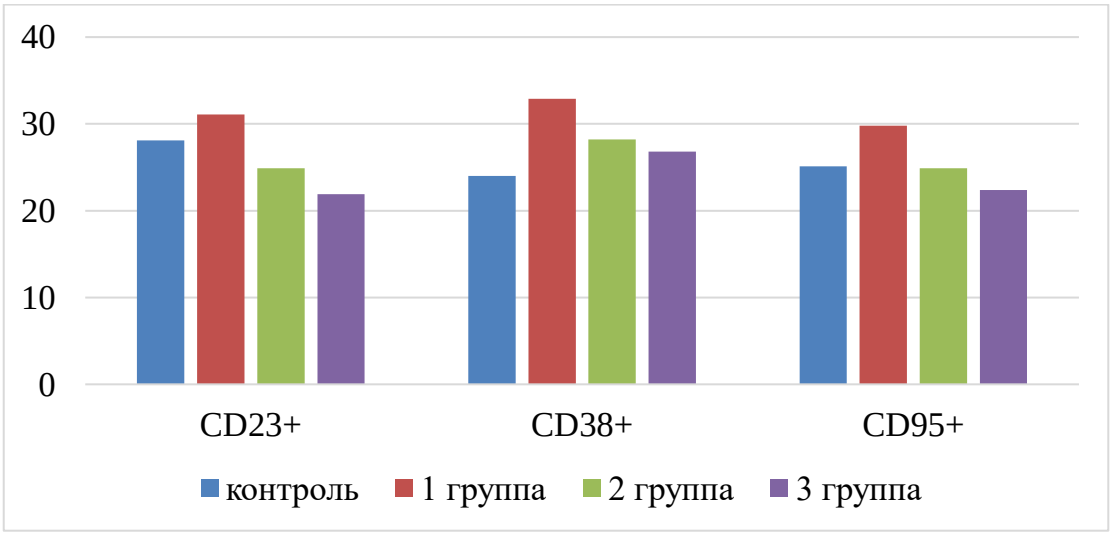
As a result of the imbalance of the main subpopulations of T cells, a significant decrease in the immunoregulation index is observed; in sick children of groups 1 and 2 with allergopathology, it was 1.05 ± 0.1 and 1.1 ± 0.9, respectively, against 1.5 ± 0.1 in healthy children 4-6 years old (P<0.05) (Table 4.2).

Cellular cytotoxicity caused by the activity of natural killer cells is one of the key links in natural (innate) immunoresistance.

The number of lymphocytes with the CD16+ phenotype in patients in the study groups only tended to increase (Table 4.2).

I would like to draw attention to the fact that the expression of activation markers CD23+, CD38+, CD95+ in children 4-6 years old is almost no different from control indicators. In the 1st group of children there is an increase in the level of CD38+ expression compared to groups 2 and 3.

I would also like to note the high level of activation of lymphocytes with the marker CD23+, and with regard to the marker of lymphocyte apoptosis (CD95+), this indicator tended to increase in the 1st group of patients (Fig. 1).



Rice. 1. Activation markers of the immune system in children 4-6 years old, with allergic diseases, living in various areas of the Jizzakh region

Analysis of the work of the humoral component of immunity showed that certain changes also occur in the population of B-lymphocytes in the studied groups of patients (Table 3).

Table 3. Indicators of the humoral component of the immune system of children 4-6 years old with allergic diseases living in various areas of the Jizzakh region

Indicators	Control group	Study groups		
		1 group	2 group	3 group
Ig G, mg%	1168,7±40,4	1093±24,2	1041,3±27,1	1034,2±39,2
Ig A, mg%	131,0±6,8	144,7±8,2	161,2±6,1*	138,9±5,6
Ig M, mg%	112,9±9,5	106,4±2,8	126,1±3,8*	117,1±3,9
large Central Election Commissions	10,1±1,4	19,5±1,7*	11,7±1,3	8,4±1,3
CEC small	17,5±2,1	26,2±2,7*	18,9±2,9	16,1±1,2

Note: * - data reliability between groups

When considering the expression of the B-lymphocyte marker - CD20+, a significant increase in expression was revealed in the 1st group by 1.36 times, in the 2nd group by 1.3 times, and in the 3rd group only a tendency towards an increase in B-lymphocytes was noted.

Thus, the absolute number of B-lymphocytes in the healthy group averaged 642.6±66.4 cells per μl, in children of the 1st group - 876.1±34.8 cells per μl ($P<0.05$), in the 2nd group - 834.2±42.7 cells per μl (Table 2).

Moreover, with an increased level of expression of CD20+ antigens on the surface membrane of cells, reduced synthesis of IgG in the blood serum was detected in all three study groups.

I would like to note a significant increase in the levels of IgA and IgM in group 2 ($P<0.05$).

The level of large and small circulating immune complexes (CIC) in the blood serum was significantly increased only in group 1 of patients and was significantly different from the average values in the control group and in groups 2 and 3 ($P<0.05$).

Next, we examined the immunological reactivity in children 7-14 years old with allergic diseases living in various regions of the Jizzakh region.

Common features in the immune status of the examined patients were leukocytosis and lymphocytosis. The detected leukocytosis had a significant difference ($P<0.05$) only in the 1st group of patients (11065.0±186.7) compared with the control group (7400.7(254.1).

Lymphocytosis was observed in all study groups, which was reflected in both relative and absolute indicators (Table 4.4). The number of T-lymphocytes was also increased, which had a significant difference in the 1st group of patients (56.2±2.1%), and in the 3rd group it only tended to increase (52.8±1.8%), but in In the 2nd group, T-lymphocytes were slightly reduced (48.2 ± 1.9%) relative to the control figures (53.6 ± 1.5%) (Table 4).

Further study of the subpopulation composition of T-lymphocytes showed that the relative level of T-helper cells was increased in group 1, and absolute indicators tended to increase in all three groups, and only in group 1 of patients (976.1±38.1/μl) the absolute number of helpers was significantly higher than control indicators (633.9 ± 66.6/μl) (Table 4).

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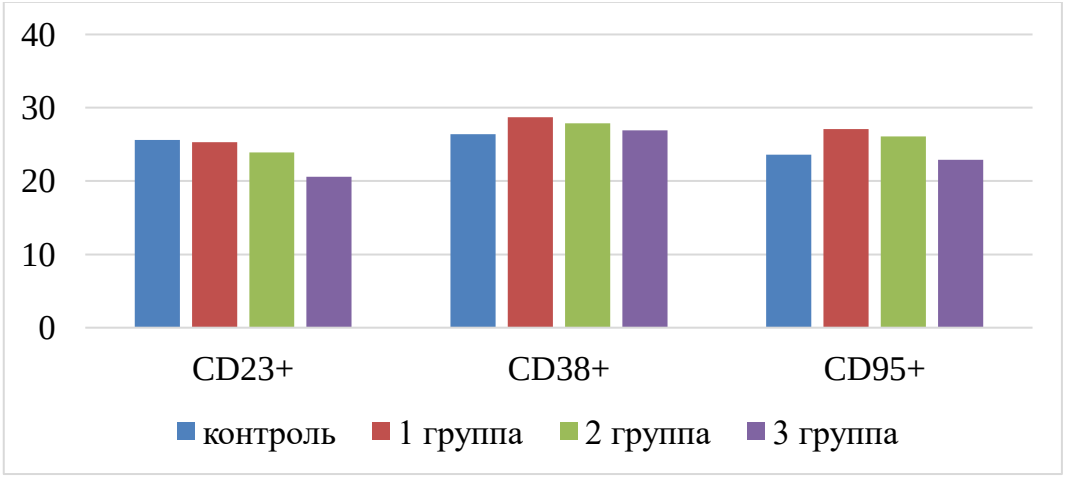
Table 4. Indicators of the cellular component of the immune system of children 7-14 years old with allergic diseases living in various areas of the Jizzakh region

Indicators	Control group	Study groups		
		1 group	2 group	3 group
Leukocytes, µl	7400,7±254,1	11065,0±186,7*	7418,9±317,2	7039,8±133,7
lymphocytes, %	32,9 ± 2,09	47,8±1,9*	38,7±3,8	41,1±2,3
lymph., µl	2288,6±260,4	3854,0±118,9*	2692,3±313,4	2732,6±254,7
CD3+, %	53,6 ± 1,5	56,2±2,1	48,2±1,9	52,8±1,8
CD3+, mkl	1207,8 ±129,8	1983,2±104,7*	1489,3±47,2	1466,1±102,0
CD 4+, %	28,2 ± 1,0	32,9±2,1	27,2±1,9	28,9±1,7
CD4+, mkl	633,9± 66,6	976,1±38,1*	678,7±22,4	768,9±75,4
CD8+, %	23,4 ± 1,0	31,9±1,3*	21,4±1,2	23,3±1,3
CD8+, mkl	532,9 ±59,6	897,2±72,4*	712,6±79,3*	691,3±72,3
ИРИ	1,2 ± 0,1	1,2±0,2	1,4±0,1	1,3±0,3
CD16+, %	18,6 ± 0,5	16,2±1,2	21,8±1,3	18,7±1,9
CD20+, %	24,9 ± 1,57	21,3±0,9	23,4±0,7	22,6±0,5
CD20+,mkl	551,8 ± 57,2	764,1±82,3*	578,2±56,4	5876,3±83,5
CD23+, %	25,6 ± 1,9	25,3±1,2	23,9±0,9	20,6±1,6
CD38+ , %	26,4 ± 1,7	28,7±1,3	27,9±2,2	26,9±2,4
CD95+,%	23,6 ± 2,2	27,1±1,9*	26,1±1,2	22,9±1,35

Note: * - reliability of data between groups (P<0,05)

At the same time, in patients aged 7-14 years, the suppressor activity of T-lymphocytes also predominated. In groups 1 and 2, the absolute indicator of CD8+ cells (897.2 ± 72.4/µl and 712.6 ± 79.3/µl, respectively) versus control indicators (532.9 ± 59.6/µl) (Table 4).

When considering the expression of activation markers CD23+, CD38+,CD95+ in children 7-14 years old with allergic diseases, a significant increased expression of apoptosis receptors CD95+ was revealed in groups 1 and 2 relative to control indicators (Fig. 2).



Rice. 2. Activation markers of the immune system in children 7-14 years old, with allergic diseases, living in various areas of the Jizzakh region

The most important indicators of the humoral response are immunoglobulins G, M and A. A study of the level of various immunoglobulins depending on the region of residence revealed some features in the group of children 7-14 years old (Table 5).

Table 5. Indicators of the humoral component of the immune system of children 7-14 years old with allergic diseases living in various areas of the Jizzakh region

Indicators	Control group	Study groups		
		1 group	2 group	3 group
Ig G, мг%	1248,8 ± 49,1	965,5±34,8*	987,3±47,1	1039,3±39,8
Ig A, мг%	148,7±4,7	181,7±9,3	151,7±7,8	149,1±8,5
Ig M, мг%	97,6± 5,2	109,0±1,4	113,4±3,8	106,1±7,5
large Central Election Commissions	12,1±1,6	17,8±1,9	7,8±1,7	7,6± 2,5
CEC small	21,5±2,3	23,7±1,9	15,2±1,8	17,2±1,5

Note: * - reliability of data between groups (P<0,05)

Thus, in all study groups, the level of IgG was significantly reduced compared to the control group (1248.8 ± 49.1 pg/ml).

In group 1 (965.5±34.8 pg/ml), this difference was significant (P<0.05). The level of IgA was slightly increased in groups 1 and 2, while in group 3 it was close to the control value.

In terms of the level of IgM and circulating immune complexes, the groups under consideration did not have significant differences among themselves (Table 5).

Conclusions

Thus, the data obtained on the nature of immunological disorders in children with allergic diseases living in various areas of the Jizzakh region make it possible to determine the characteristics of the impact of climatic, environmental and industrial factors on the immune system and the nature of the necessary preventive, diagnostic and therapeutic measures aimed at preserving the health of persons susceptible to these influences.

The data obtained can be used to determine the need for specialized immunological and allergological care when adding an allergist-immunologist to the staff. The identified interdependencies between the clinical manifestations of immunopathology and allergic diseases make it possible to identify additional points of attention for the doctor when forming a therapeutic strategy and tactics for each patient.

In all studied forms of allergic diseases in children, systemic changes in the immune status were unidirectional and depended on the severity of the process and the age of the patients.

The conducted studies illustrated the pathogenetic significance of dysregulation of immunological mechanisms in allergic inflammation and the diagnostic information value of monitoring the systemic immune profile and their dependence on the direction of the allergic disease, etiological and trigger factors.

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