SOME FEATURES OF IMMUNE STATUS INDICATORS IN SCHOOL CHILDREN OF JIZZAKH REGION OF RUz SUFFERING ALLERGIC DISEASES

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https://doi.org/10.5281/zenodo.7842016

Abstract. *The need to study the effects of environmental factors on humans is constantly increasing due to the changing environmental and industrial environment. Due to the intensive development of various industries, a significant number of people are and will be exposed to chronic exposure to production factors. The purpose of our study was to study the characteristics of the immunoreactivity of children with allergic rhinitis (AR), bronchial asthma (BA), atopic dermatitis (AD), living in 3 regions of the Jizzakh region that are different in climatic, environmental and industrial conditions.*

Keywords: *environmental factors, immunoreactivity of children, allergic rhinitis, bronchial asthma.*

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.

The leading role among IgE -dependent diseases, in addition to allergic rhinitis and atopic dermatitis, belongs to atopic bronchial asthma, which is a serious social problem due to its high prevalence, severe clinical course, as well as early disability and the risk of death.

The need to study the effects of environmental factors on humans is constantly increasing due to the changing environmental and industrial environment.

Due to the intensive development of various industries, a significant number of people are and will be exposed to chronic exposure to production factors.

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 zone of their activity.

The immune system subtly reacts even to low concentrations of chemical agents, to small doses of electromagnetic and ionizing radiation, to stress by the development of functional changes that can develop into persistent immunity disorders, manifested by the growth of infectious, allergic, autoimmune and proliferative diseases.

The picture and mechanisms of the development of immune system dysfunction in the children's population of the Jizzakh region are far from being fully studied at the moment. There are no data on the formation of immunological disorders in children with isolated and combined exposure to production factors; the effect of living conditions on the immune system has not been studied. There are also no generalized data on 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 disorders of various body systems, especially the immune system due to its integrating value in maintaining homeostasis and high sensitivity.

The foregoing indicates the high relevance of the work on assessing the immunological status of children with allergic diseases living in various areas of the region (industrial, agricultural, foothill).

Despite a number of studies conducted on the 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.

The purpose of our study was to study the characteristics of the immunoreactivity of children with allergic rhinitis (AR), bronchial asthma (BA), atopic dermatitis (AD), living in 3 regions of the Jizzakh region that are different in climatic, environmental and industrial conditions.

Materials and Methods. In total, we examined 110 children aged 7 to 14 years with allergic rhinitis, bronchial asthma, atopic dermatitis, living in 3 regions of the Jizzakh region, and depending on the place of residence, the examined children were divided into 3 study groups:

Group 1 - 57 children (51.8% of the total number of children examined) living in the city of Jizzakh;

group 2 - 36 children (32.7%) living in the Forish district of the Jizzakh region;

Group 3 - 17 children (15.4%) living in the foothill Mirzachul district of the Jizzakh region.

The control group consisted of 30 healthy peers.

Results. The distribution of children in the studied groups, depending on the nosology of allergic diseases, is presented in Table 1.

Table 1.

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

City/village	Nosological units			Total
	AR	BA	AtD	
Jizzakh city	21(19.0)	19(17.2)	17(15.4)	57(51.8)
Farish district	13(11.8)	12(10.9)	11(10.0)	36(32.7)
Mirzachul 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)

Taking into account the general atopic nature of the considered allergic diseases, approximately the same distribution of patients according to the nosological forms of allergic diseases, we decided to divide them into groups only depending on the region of residence and the age of the patients.

Analysis of the total number of leukocytes showed moderate leukocytosis in all groups of patients examined.

Significant differences ($P<0.05$) with the control group (6308 ± 0.8 μl) this indicator had in groups 1 and 2 of patients (10974±183.1 μl and 9837±833.6 μl , respectively) (Table 2) .

In the study of immunoregulatory subpopulations of lymphocytes, an imbalance was found in the subpopulation composition of T-lymphocytes. It is known that lymphocytes with CD4+ markers, that is, T-helpers, play a leading role in the cytokine cascade when the immune response to the introduced antigen is turned on.

Significant suppression (P<0.05) of the expression of T-helper marker receptors was observed in group 2 patients (25.2±1.5%), which is lower than in groups 1 or 3 and in the control group, which indicates the functional failure of this parts of the immune system.

The absolute number of CD4+ cells were significantly increased in the 2nd and 3rd groups compared with the control data (Table 2).

Table 2.

Indicators of the cellular link of the immune system of children 4-6 years old with allergic diseases living in different 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	1 8 9 5 ± 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	9 79 ±4 0 , 2	1 30 9, 1 ±1 27 .1*	10 87 .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+, µl	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 of the main subpopulations of T-lymphocytes is cytotoxic lymphocytes with CD8+ surface receptors; their increase was noted in patients of the studied groups.

So, 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 allergic pathology compared with the control group (P<0.05).

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

The results obtained may indicate the presence of a sufficiently high proportion of suppressor cells in the studied population, since the CD8+ population is heterogeneous, this receptor is expressed not only by cytotoxic, 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 was observed; in sick children of the 1st and 2nd groups with allergic pathology, it was 1.05 ± 0.1 and healthy children aged 4-6 years (P<0.05) (Table 2).

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

The number of lymphocytes with CD16+ phenotype in patients of the studied groups had only a tendency to increase (Table 2).

I would like to draw attention to the fact that the expression of activation markers CD 23+, CD 38+, CD 95+ in children aged 4-6 years almost does not differ from the control parameters.

In the 1st group of children, an increase in the expression level of CD 38+ is expected compared to groups 2 and 3. I would also like to note the high level of activation of lymphocytes with the CD 23+ marker, and in relation to the lymphocyte apoptosis marker (CD 95 +), this indicator tended to increase in the 1st group of patients (Fig. 2).

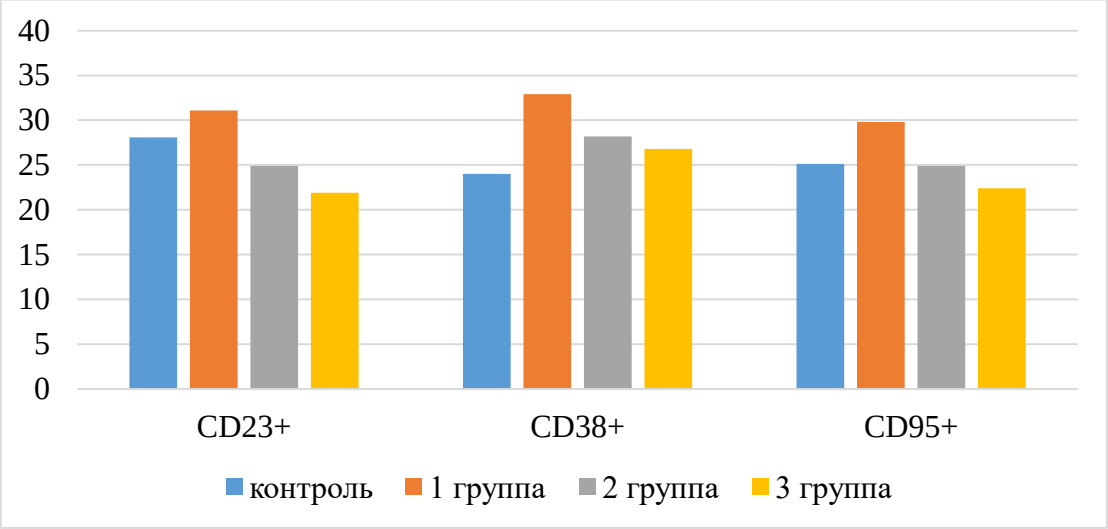


Fig.2. Activation markers of the immune system in children 4-6 years old with allergic diseases living in different regions of the Jizzakh region

An analysis of the work of the humoral link 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 link of the immune system of children 7-8 years old with allergic diseases living in different regions 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
CEC large	1 0 .1± 1.4	19.5 ± 1.7 * _ _ _	11.7 ± 1.3 _	8.4 ± 1.3 _
CEC small	1 7 , 5 ± 2 , 1	26.2±2.7*	18.9±2.9	16.1±1.2

Note: * - reliability of data between groups

When considering the expression of the marker of B-lymphocytes - 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 to 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 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, a reduced synthesis of IgG in the blood serum was found in all three studied groups.

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

The level of large and small circulating immune complexes (CIC) in the blood serum was significantly increased only in the 1st group of patients and significantly differed from the mean 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 different 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 the studied groups, which was reflected both in relative and absolute terms (Table 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 had a tendency to increase (52.8±1.8%), but in the 2nd group of T-lymphocytes was slightly reduced (48.2±1.9%) relative to the control figures (53.6±1.5%) (Table 4.4).

Further study of the subpopulation composition of T-lymphocytes showed that the relative level of T-helpers was increased in the 1st group, and the absolute values tended to increase in all three groups, and only in the 1st group of patients (976.1±38.1/ μl) the absolute number of helpers was significantly higher than the control values (633.9± 66.6/ μl) (Table 4.4).

Table 4

Indicators of the cellular link of the immune system of children 7-14 years old with allergic diseases living in different regions of the Jizzakh region

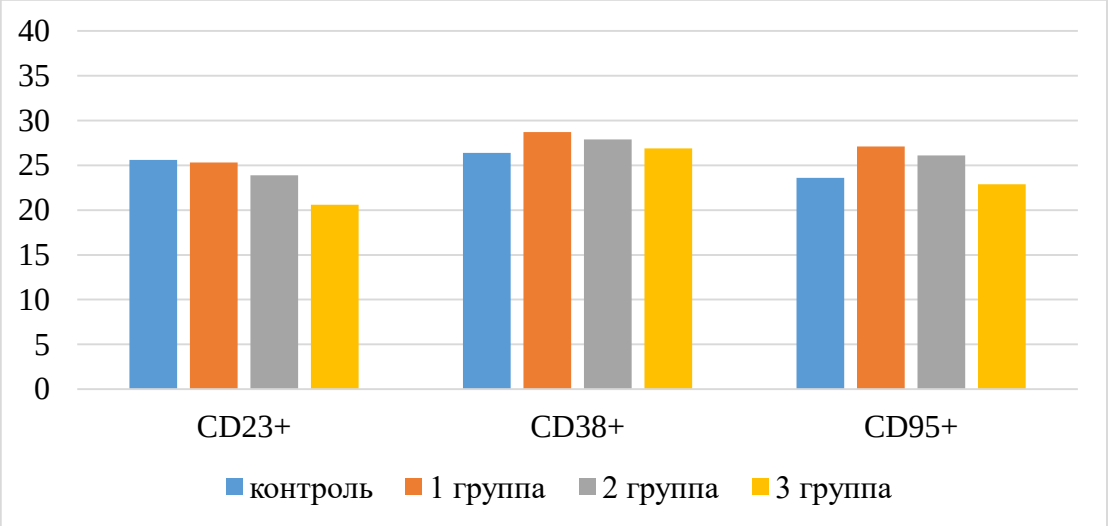
Indicators	Control group	Study Groups		
		1 group	2 group	3 group
Leukocytes, μl	7 4 00.7 ±254.1	11065.0±186.7*	7418.9±317.2	7039.8±133.7
Lymphocytes, %	32.9 ± 2.09	47.8±1.9*	38.7±3.8	41.1±2.3
Lymph., μl	2288.6±260.4	3854.0±118.9*	2692.3±313.4	2732.6±254.7
CD3+, %	53.6 ± 1.5	56.2±2.1	48.2±1.9	52.8±1.8
CD3+, μl	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+, μl	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+, μl	532.9±59.6	897.2±72.4*	712.6±79.3*	691.3±72.3
IRI	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+, µl	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)

Suppressor activity of T-lymphocytes also prevailed in patients aged 7-14 years. In the 1st and 2nd groups, the absolute rate of CD8+ cells (897.2±72.4/ µl and 712.6±79.3/ µl, respectively) against the control values (532.9±59.6/ µl) (tab. 4).

When considering the expression of activation markers CD 23+, CD 38+, CD 95+ in children aged 7-14 years with allergic diseases, a significant increase in the expression of apoptosis receptors was revealed. CD 95+ in the 1st and 2nd groups relative to the control indicators (Fig. 3).



Rice. .3. Activation markers of the immune system in children 7-14 years old with allergic diseases living in different regions of the Jizzakh region

The most important indicators of the humoral response are immunoglobulins G, M and A. The 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 4.5).

Table .5.

Indicators of the humoral link of the immune system of children 7-14 years old with allergic diseases living in different regions of the Jizzakh region

Indicators	Control group	Study Groups		
		1 group	2 group	3 group
Ig G, mg%	1248.8 ± 49.1	965.5±34.8*	987.3±47.1	1039.3±39.8
Ig A, mg%	148.7±4.7	181.7±9.3	151.7±7.8	149.1±8.5
Ig M, mg%	97.6± 5.2	109.0±1.4	113.4±3.8	106.1±7.5
CEC large	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) of IgG was significantly reduced compared to the control group (1248.8 ± 49.1 pg /ml).

In the 1st group (965.5±34.8 pg /ml) this difference was significant (P<0.05) .

The level of IgA was slightly increased in the 1st and 2nd groups, while in the 3rd group it was close to the control indicator .

According to the level of IgM and circulating immune complexes, the groups under consideration did not have significant differences between themselves (Table 5) .

Thus, the data obtained on the nature of immunological disorders in children with allergic diseases living in various districts of the Jizzakh region make it possible to determine 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 maintaining the health of people subject to these influences.

The data obtained can be used to determine the need for specialized immunological and allergological care when an allergist-immunologist is included in the staff.

The revealed interdependences of clinical manifestations of immunopathology and allergic diseases make it possible to determine additional points of attention for a 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, depending on the severity of the process and the age of the patients.

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

In our work, we determined the content of cytokines that play a key role in the activation of the immune system.

In the examined group of children, an increase in the content of IL-lβ in the blood serum was noted: the level of serum IL- lß in the control group was 0.3 ± 0.03 pg / ml, which is significantly lower than in children with signs of atopy (9.06 ± 2 .6 pg /ml).

The level of IL-4 in the blood serum depended on the activity of the allergic disease in children.

When the disease worsened, it increased and averaged 22.3±4.5 pg /ml, which significantly exceeds this figure in healthy children (0.23±0.04 pg /ml).

A slightly different picture was observed in the study group of children aged 7 years.

IFN values in the control group of children significantly exceeded those in atopic children (28.9±13.9 pg /ml and 6.7±3.0 pg /ml, respectively), which indicates a past viral infection and activation of antiviral immunity.

Moreover, the values of IFN in both healthy and sick children of this age group significantly exceeded the corresponding indicators of the younger age group.

A significant increase in the average level of IL lß - in the blood serum of children with atopy (37.4±14.7 pg /ml), as well as IL-4 (95.5±25.0 pg /ml) indicates the relationship of these indicators with the severity of the disease.

In the control group, the average level of these indicators was low.

At the same time, more than 4-fold differences in this indicator were observed among atopic children towards higher values in older children.

Conclusions. Thus, the immune response in children suffering from allergic diseases in the Jizzakh region has some peculiarities.

They consist in a decrease in the synthesis of IFN in the presence of a high activity of the allergic process, which is confirmed by an increase in the secretion of IL- 1ß and IL-4, as well as in total IgE in the blood serum.

Such deficiency increases the susceptibility to bacterial and viral infections, which, as a rule, recur in this pathology.

These changes may be the result of exposure to external stimuli, in particular, environmental living conditions.

Under the influence of external stimuli, metabolic processes shift, the functional mobility of various body systems changes.

Such shifts are accompanied by a change in physicochemical processes, which, in turn, affects the chemistry of blood, lymph and tissue fluid (i.e., the state of the "internal environment of the body"), which cannot be without an immunological restructuring of the child's body.

In general terms, it can be said schematically that the body seeks to maintain the constancy of the internal environment by changing the ongoing metabolic processes and, thus, enters into a state of equilibrium with the environment.

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