

## Immunodeficiency States in Persons Residing in the Oil-Producing Regions of Kazakhstan

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**Abstract:** Aim of the research is to investigate immunodeficiency of people, residing in the oil-producing region and determine the contribution of environmental factors to the frequency of allergic diseases in the study area. By the results of testing among 2789 of studied residents were taken 424 people with Immuno Deficiency Syndrome (IDS) of 2 and 3 stages which were held 2 level immunological tests. For the assessment of cellular immunity sets used monoclonal and polyclonal antibodies for human leukocyte antigens differentiated by immunofluorescence. To assess the reliability of the results and determine the level of contribution of environmental factors in the incidence of allergic diseases in the study area, analysis of variance was conducted. To assess the connection degree of morbidity of allergoses with air pollution correlation analysis was conducted. Quality of diseases as pollinosis ( $F = 7.5$ ,  $dt = 4.1$  and  $F = 0.5$   $p < 0.05$ ) bronchial asthma ( $F = 3.5$ ,  $dt = 5.1$  and  $F = 0.5 = 3.8$   $p < 0.05$ ) dermatitis ( $F = 9.7$ ,  $dt = 1.2$  and  $F = 0.1 = 13.5$   $p < 0.001$ ) and other allergic diseases ( $F = 2.5$ ,  $dt = 2.1$  and  $F = 0.5$   $p < 0.05$ ). Thus, we claim with the confidence that the combined effect of air chemical factors leads to the population of immunodeficient states against which increases the risk of allergic diseases and other immunodeficiencies.

**Key words:** Immunodeficiency, oilfields, allergic pathology, anthropogenic load, stages

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### INTRODUCTION

In recent years, oil and gas industry is intensively developing in the Western region of Kazakhstan, the new ones are developing and proven oil and gas fields are increasing their capacity. Large-scale development of the Western region of Kazakhstan oil has a negative impact on the quality of basic environmental facilities and production environment. In recent years, the environmental situation in the western region of Kazakhstan is considered to be extremely tense.

It is known that long-term contamination of the environment by chemicals, even in low concentrations can cause a number of acute pathological processes of a person, exacerbation of chronic diseases, exacerbating the severity and duration of their course. This negatively affects the health of the population and leads to increase of morbidity, including those who are working in oil and gas companies (Vasilenko, 2006; Yermukhanova and Utesheva, 2010; Zasorin *et al.*, 2012).

Clinical signs of immunological disorders are varied but the most characteristic feature of all the pathological processes which are based on the defects of the immune system is the propensity for severe chronic and current

diseases. In addition to infectious syndrome, immunological disorders are diagnosed by clinical symptoms of allergic, autoimmune and immunoproliferative states (Zasorin *et al.*, 2013). The rapid growth of all ergological diseases, according to a recent and different rates of its distribution in the different regions make it difficult to study the epidemiology of allergic diseases. The aim of the research was to examine the conditions in immunodeficient individuals living in the oil-producing region and the definition of the contribution of environmental factors in the incidence of allergic diseases in the studied areas.

### MATERIALS AND METHODS

To assess the degree of influence of environmental factors on the immune resistance of the organism, we have developed a questionnaire to identify immunodeficient states for persons living in the study area. Evaluation of the data obtained in the survey carried out on the 2-point scale: 0 points - the absence of sign; 1 point - for each available sign. It were questioned 2,789 persons aged 20-60 year living in the 3 study areas with different levels of anthropogenic load (1st area - the

territory of the industrial zone, the 2nd area-average area, 3rd area-an area distant from stationary sources contamination). The data were processed by the method of variation statistics taking into account both summary measures and on the individual parameters.

According to the results of questioning, selected investigations were conducted on the immune status of 1,322 residents living in these areas. We determined the parameters of cellular and humoral immunity by conventional means using 1 level tests (Stolyarov, 1999).

Evaluation of Immunodeficiency Syndrome (IDS) conducted by Zemskov's method. According to the results of the testing of these 3 micro-regions were selected 958 people with IDS 2 and 3 stage which were carried out immunological tests 2 level is also linked dearness of on going study. From the 958 surveyed by tests of level 2 1 micro territory passed-376 people, 2 mikroterritorii-297, 3 mikroterritorii-285 people.

To assess the state of cellular immunity sets of monoclonal and polyclonal antibodies were used for the determination of human leukocyte differentiation antigens by immunofluorescence. By this method the following lymphocyte subpopulations were determined: (CD3, T-lymphocytes; CD4, T-helper; CD8, T-suppressor; CD16, NK-cell; CD20, B-lymphocytes; CD23, activated B-lymphocytes; CD45, all leukocytes; CD95, activated lymphocytes; HLA-DR, monocytes) activated T-lymphocytes).

Due to the presence of metals in the environment object has an immunotropic effect in mikro-territorys ectional we conducted an analysis of the level and morbidity structure of people due to the presence of immuno deficiency states was conducted. Considering that according to the adopted methodology of the accounting diseases of immuno deficiency basically just allergic diseases are recorded, we carried out the analysis of the prevalence of allergies in the study are a based on the level of anthropogenic load.

## RESULTS AND DISCUSSION

Analysis of the results showed that among patients in general predominate persons suffering from pollinos is (61.2%). Allergic rhinitis was observed in 22.3%, asthma-18.7%, hives-14%. The remaining allergies (dermatitis, food and drug allergies, allergic conjunctivitis, etc.,) accounted for 4.8% (Fig. 1).

In order to assess the connection degree of morbidity of all ergosises with air pollution correlation analysis was conducted. A direct strong link between the environmental quality (air) and the incidence of pollinos

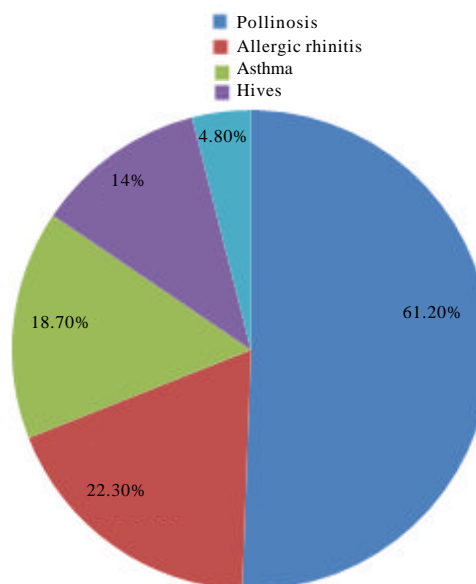


Fig. 1: Structure of allergic diseases

is ( $r = 0.73, p < 0.05$ ) is determined the average direct link between the atmospheric air and the incidence of asthma ( $r = 0.62, p < 0.05$ ) as well as a direct link between the average ambient air and dermatitis ( $r = 0.6, p < 0.05$ ) independent of age and gender.

Analysis of variance was performed to assess the validity of the results and determine the level of contribution of environmental factors in the incidence of allergic diseases in the studied areas. It is found that the quality of diseases such as pollinos is ( $F = 7.5$ , when  $dt = 4.1$  and  $F_{0.5} = 3.5, p < 0.05$ ), bronchial asthma ( $F = 3.5$  when  $dt = 5.1$  and  $F_{0.5} = 3.8, p < 0.05$ ), dermatitis ( $F = 9.7$  when  $dt = 1.2$  and  $F_{0.1} = 13.5, p < 0.001$ ) and other allergic disease ( $F = 25$  at  $dt = 2.1$  and  $F_{0.5} = 2.4, p < 0.05$ ).

Summarizing the results we can conclude that quite clear relationship between air quality and levels of allergen-morbidity is marked.

Thus, with a sufficient degree of certainty it can be argued that the combined effect of chemical factors of air leads to the formation of the immunodeficient states among people against which the risk of development of allergic diseases and other immune deficiencies will be increased.

Important tasks in solving regional problems are presented by the comprehensive assessment of the risk to public health in the residential areas, the development of regional criteria for evaluating of imbalance of the immune response to the impact of external factors, preventive measures based on the optimization of assessment methods and risk management, forecasting the formation of the epidemiological situation. Methodology for

evaluation of the functional state of the immune system becomes an important tool in the management of the environment and health. One of the main objectives of our study was to assess the possibility of its use in practice in the urbanized territories.

Analysis of morbidity structure caused by immunodeficiency was carried out in connection with the discovery in the environmental objects of metals having immunotropic action depending on area of residence.

#### **CONCLUSION**

Analysis of the prevalence of allergoses has shown that generally among patients persons predominate who are suffering from (pollen allergy, 61.2%; allergic rhinitis, 22.3%; bronchial asthma, 18.7%; rash, 14%). Persons with allergic diseases are prevalent in the micro area, located in the industrial area (39.4% of the total number of cases) the percentage of persons with allergic diseases decreases with distance from the industrial zone.

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