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The Role of Interleukins in the Diagnosis of Rhinosinusitis

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Abstract: This article aims to evaluate the role of cytokines and IgE molecules in the pathogenesis of AR in patients with allergic rhinitis, comparing the results of the examination in patients and healthy people. Allergic rhinosinusitis is a symptomatic feature caused by the allergenic effect of the nasal mucosa, which leads to inflammation through IgE. Atopic diseases such as allergic rhinitis, bronchial asthma, drug allergy, etc. are characterized by an immune reaction mediated by IgE against antigens - allergens.

Keywords*: rhinosinusitis, allergic rhinosinusitis, IgE, interleukin, IL-4, IL-13.*

1. Introduction

Rhinosinusitis (RS) is a collective term that characterizes a group of acute or chronic inflammatory diseases of the nasal cavity and paranasal sinuses. RE Glilklich et al. they say that acute rhinosinusitis is a pathology that has a huge negative impact on the quality of life and professional activity, and the quality of life of a patient with acute rhinosinusitis is worse than that of patients with coronary heart disease. Volkov A.G., Trofimenko S.L. and others studied changes in the immune status in patients with rhinosinusitis. A lot of materials have been accumulated on the relationship of clinical signs of various forms of rhinosinusitis with changes in immune status indicators. However, to date, these data have not been systematized for the purpose of their practical application in the daily practice of an otorhinolaryngologist to improve the efficiency of diagnosing rhinosinusitis.

According to the observations of American scientists, over the past 2 years, cases of prolonged course and frequent relapses of RS have become more frequent, due to the ineffectiveness of the accepted treatment regimens [13]. Of particular importance is the irrational use of certain drugs by the patients themselves, the control of which is given insufficient attention by otorhinolaryngologists [9,14,17]. In this regard, the development of methods for adequate monitoring of patient treatment is one of the urgent tasks for specialists.

The aim of this research was to study the clinical and immunological features of the course of rhinosinusitis against the background of allergies.

2. Materials and methods of research.

The study was conducted on the basis of an advisory ENT polyclinic of the multidisciplinary clinic of the Tashkent Medical Academy from February 2022 to January 2023. The study included a one-year follow-up of 84 patients with acute RS and RS with allergic etiology. During the study, all patients were divided into 2 groups. Patients of both study groups during the course of treatment received a similar set of drug groups for basic treatment in the process of exacerbation of RS, which included: local corticosteroids; antihistamines; decongestants; antibiotics in the presence of an infectious factor and means for irrigation of the nasal passages. Also, to eliminate dryness and swelling, we added the drug Narivent. Groups of drugs were taken as a basis due to the wide variety of their various representatives on the country's market. The main group included 42 patients, 23 men (54.7%) and 19 women (45.3%) with an average age of 18 to 28 years. In addition to receiving standard treatment, patients were constantly monitored, which included regular examinations 2 times a month and periodic phone calls to determine the frequency of use and the amount of drugs. The main attention was paid to the control of the use of decongestants, the use of which per day was strictly limited to the use of drugs containing xylometazoline, and the multiplicity was strictly reduced to 3 times a day during exacerbations. The restriction of the use of decongestants was compensated by more frequent irrigation of the nasal cavity with saline, the frequency of which was increased to 5 times a day during exacerbations. And the use of a decongestant, the multiplicity of which is up to 2 times a day. The control group included 42 patients, 25 men (59.5%) and 17 women (40.5%) with a mean age of 18 to 28 years. Patients received standard medical therapy during exacerbations. Their examinations were carried out only during every 3 months of observation, however, their medication during exacerbations and remissions of the disease was not strictly controlled.

The SNOT-22 Outcome Test for Diseases of the Nose and Paranasal Sinuses was used as a method for studying the intensity of RS symptoms [16]. The test includes 22 points that take into account the typical symptoms of RS on a 6-point scale characterizing the degree of manifestation of symptoms: "0" points corresponds to the minimum, "5" - severe symptom activity.

The olfactory function of the nose was assessed by the traditional method of V.I. Voyachek [18] using four odorous substances. To assess the functional state of the epithelium of the nasal mucosa and paranasal sinuses, the method of studying the motor function of the ciliated epithelium was used. The transport function of the ciliated epithelium was assessed using the saccharin test [4]. The test consists of applying 3 milligrams of saccharin powder to the anterior mucosa of the inferior turbinates. The function is evaluated by the time interval from the application of the powder to the appearance of a sweet taste in the mouth.

Immunological study was carried out by enzyme-linked immunosorbent assay. In patients, the level of serum IgE immunoglobulin, as well as the concentration of interleukins IL-4, IL-13 in blood serum was determined.

Statistical processing of the obtained quantitative data was carried out on a personal computer using an application package with the calculation of the average values of the studied quantities, standard deviations, and the average error of the average value (according to the

Student's coefficient). The difference was considered statistically significant with a probability of error $p < 0.05$.

3. Results and discussion.

The results of the study showed that at the start of the study, the total average score for SNOT-22 in patients of the main and control groups was 36.5 and 37.4 points, respectively.

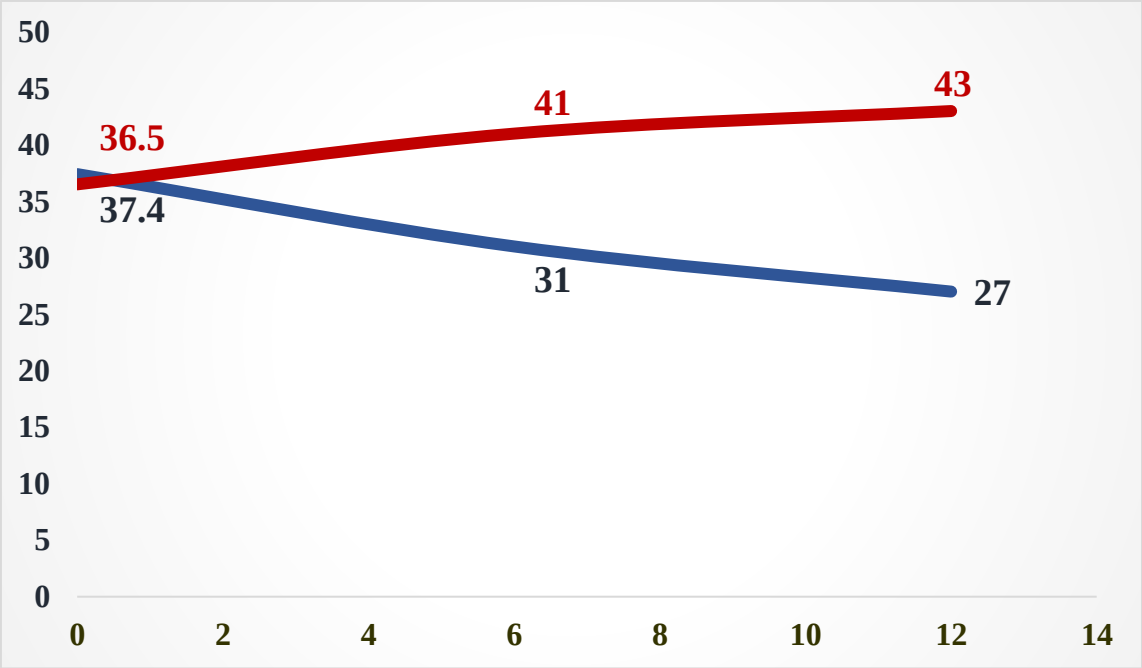


Figure 1 Dynamics of the overall intensity of manifestations symptoms in patients with RS

A re-questionnaire after 6 months showed that the patients of the main group had a decrease in the average total score to 31, while the patients of the control group had an increase in the score to 41 points. The test after 1 year showed that the average total score decreased to 27 in patients of the main group, and in patients of the control group, the indicator was equal to 43 points (Fig. 1).

Analysis of the intensity of individual symptoms of RS according to SNOT-22 showed that at the start of the study, patients in both groups had the most intense symptoms such as runny nose, nasal congestion, sneezing, rhinorrhea, facial pain, and impaired sense of smell. Their average score ranged from 2.5 to 3.5 points. Among the expressed secondary symptoms, which reflect the quality of life of patients, sleep disturbances, fatigue and decreased performance could be distinguished.

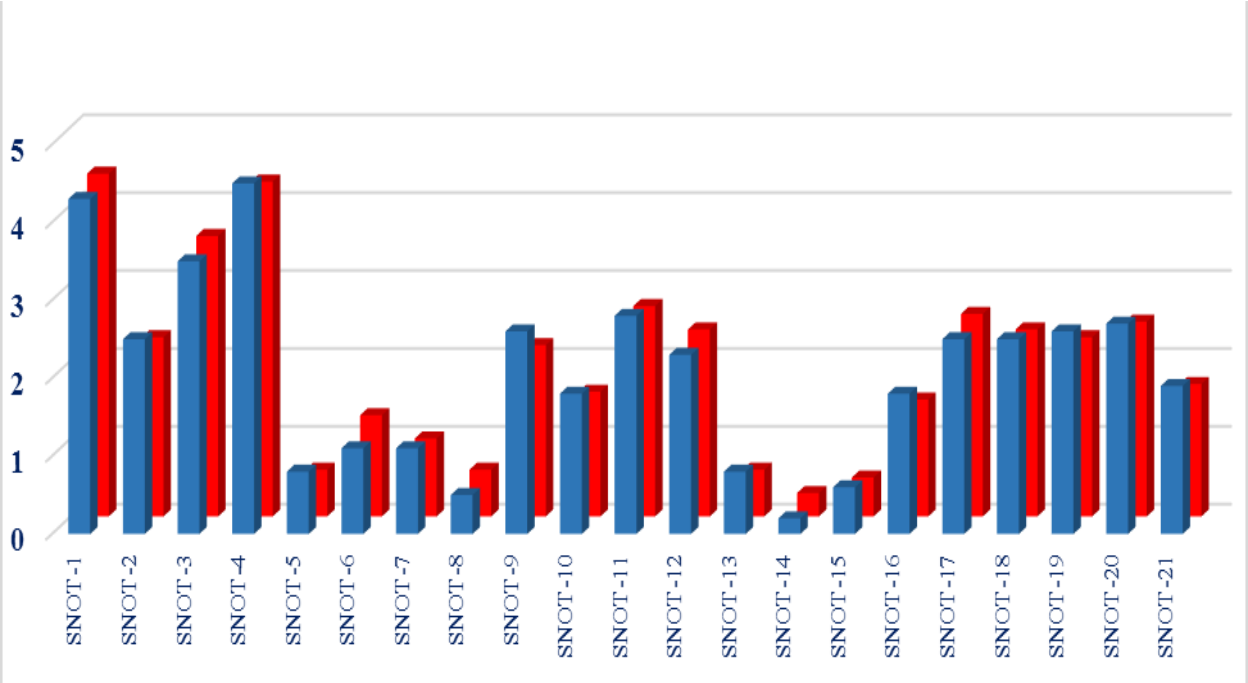


Figure 2 Evaluation of RS manifestations in patients at the start of the study

Questioning of patients after 1 year showed that in patients of the main group, a decrease in the intensity of the common cold, nasal congestion, sneezing, rhinorrhea, facial pain and decreased sense of smell. The test results also showed that there was a decrease in the severity of symptoms of a decrease in the quality of life of patients in the form of increased performance and improved sleep.

In patients of the control group, after 1 year of observation, a significant increase in the average score for all the main symptoms of RS was determined. The dynamics of indicators of the quality of life of patients also tended to worsen in comparison with the data of the main group.

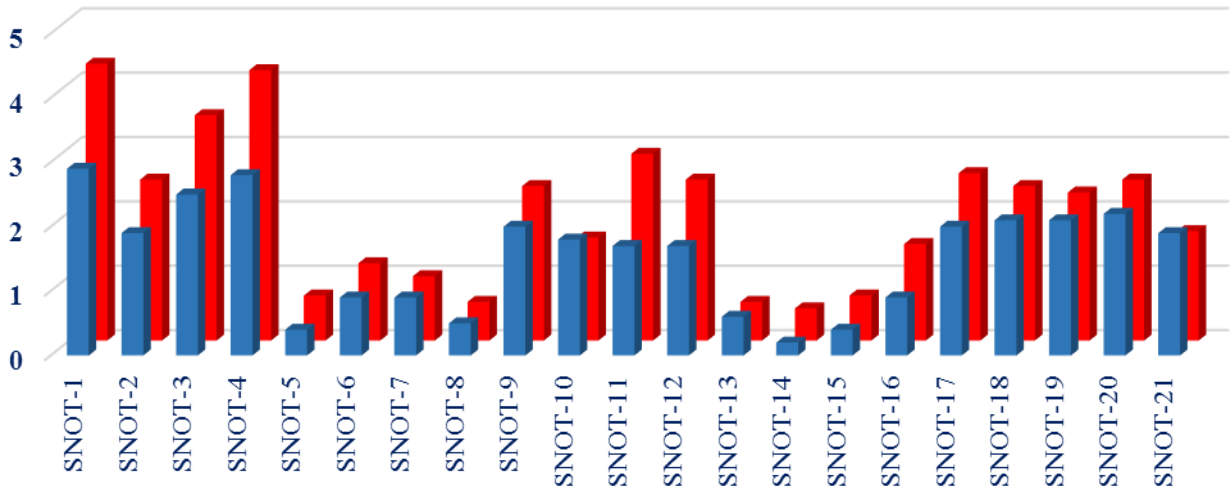


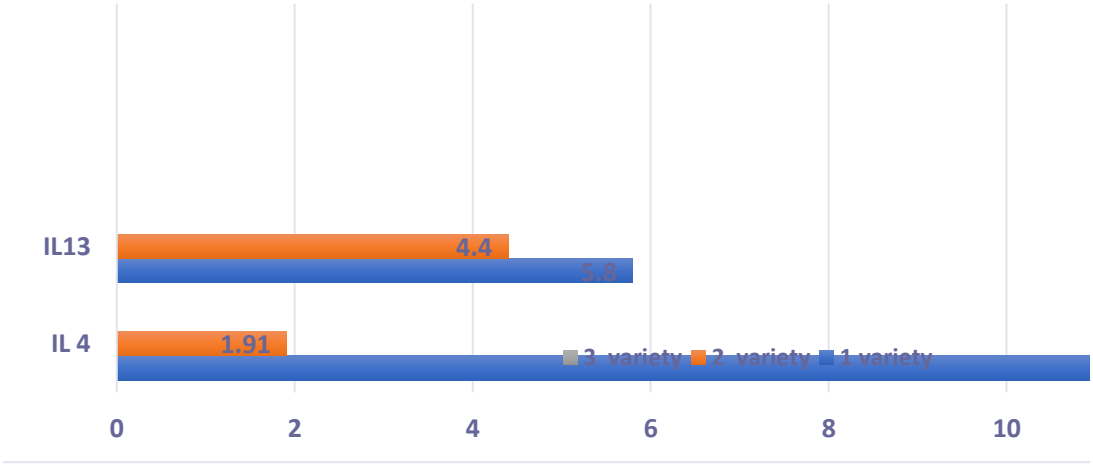
Figure 2 Evaluation of RS manifestations in patients after 1 year of follow-up

Determination of the level of cytokines in the blood serum was carried out depending on the severity of the inflammatory process.

In group I patients (rhinosinusitis with allergies) (Table 6, Figure 7).

Cytokines	M±m, пг/мл	Control group M±m, пг/мл	Significance of differences
IL-4	12,03±1,42	1,91±0,1	p>0,05
IL-13	7,802±2,4	3,06±0,6	p<0,01

Figure 7 - Cytokine balance in the I group of patients



II group of patients with acute rhinosinusitis (Table 7). The cytokine balance is practically unchanged (Figure 8).

Cytokines	M±m, пг/мл	Control group M±m, пг/мл	Significance of differences
IL-4 (0-13)	8,83±2,5	1,91±0,1	p<0,001
IL-13 (0-5)	3,1±1,9	3,06±0,6	p<0,001

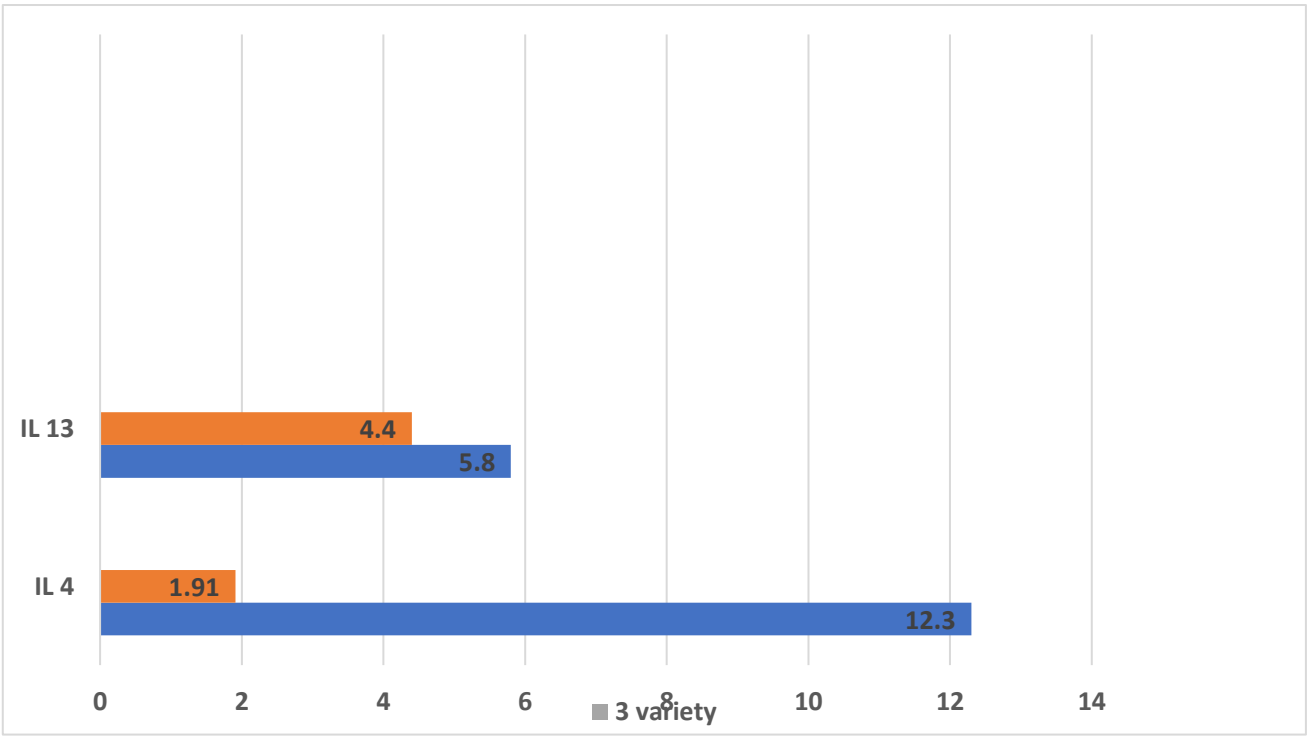


Figure 8 - Cytokine balance in group II patients

Groups	RS with AR	Acute RS	Significance of differences
IgE	156±2,5	100,1±0,1	p<0,001

IgE concentration in groups I and II

4. Discussion.

The results of the survey at the beginning of the study using the SNOT-22 test showed that in patients of both study groups, symptoms such as runny nose, nasal congestion, rhinorrhea, facial pain and decreased sense of smell prevailed in the clinic. Their severity according to the test data ranged from 2.5-3.5 points, which corresponded to the high severity of symptoms. Most of the indicators of SNOT-12-22 points, reflecting the quality of life of patients against the background of the course of chronic RS, fluctuated more widely, but also turned out to be pronounced. Analysis of the test results showed that the scores of SNOT-1-11 items correlated with the results of SNOT-12-22 items, which indicated that the intensity of the manifestation of the main symptoms significantly affects the quality of life of patients and their psycho-emotional status. Observation in dynamics showed that in patients of the main group, in whom drug therapy was carefully monitored, there was a decrease in the severity of RS symptoms, and at the same time an improvement in indicators reflecting the quality of life. In patients of the control group, in whom medication was not controlled, there was a significant increase in the intensity of symptoms and a deterioration in the quality of life. Thus, limiting the intake of decongestants and increasing the number of nasal cavity

irrigations during exacerbations of RS makes it possible to achieve a more pronounced clinical effect. The worsening of indicators in the control group indicates the leading role in the pathogenesis of chronic RS of the uncontrolled and irrational use of decongestants by the patients themselves.

Our results of immunological studies show that patients with AR have higher levels of IL-4 in serum compared to the control group and patients of the second group. In our study, serum total IgE levels were slightly different between AR controls and patients with acute rhinosinusitis. According to , the amount of IgE is relatively elevated in patients with allergic rhinosinusitis. A comparison of the concentration of IL 13 showed that in patients with AR is slightly increased than in patients with acute RS.

5. Conclusion

Thus, the results of the study showed that despite the obvious differences in the concentrations of the studied cytokines in our groups, no significant difference was observed. However, according to our data, serum levels of IL-4 and IL-13 in patients with AR are higher than in the control group and in patients with acute RS.

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