DEPARTMENT OF ALLERGOLOGY, CLINICAL IMMUNOLOGY, AND MICROBIOLOGY

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Clinical Specialist: Allergological Features of Allergic Rhinitis with Bronchial Hyperreactivity

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To establish the most informative research methods for identifying latent bronchial obstruction, ensuring an adequate assessment of the functional state of the bronchial apparatus in children with allergic rhinitis. Materials and Methods: Forty-eight children (22 boys and 26 girls) aged 5 to 14 years were included in the study group from December 2024 to August 2025

ABSTRACT

Allergic rhinitis (AR) is a disease of the nasal mucosa, underlying allergic inflammation caused by causative allergens. The current concept of the pathogenesis of allergic rhinitis is based on the leading role of IgE-mediated allergic reactions in its development, followed by developing allergic inflammation and hyperreactivity of the nasal mucosa [1,2,3,4,5]

Allergic rhinitis with bronchial hyperreactivity (ABH) is a severe form of allergic rhinitis. The close anatomical and physiological relationship (shared mucosa and the presence of the nasal-bronchial reflex) can lead to the development of bronchial asthma (BA). [6,7,8,9].

Inclusion criteria: children with allergic rhinitis characterized by nasal itching, sneezing with watery nasal discharge, difficulty breathing through the nose, and the development of a spasmodic and choking cough.

Allergy testing was performed using skin prick tests with various non-infectious allergens.

Immunological testing included determination of total IgE concentration in serum using enzyme-linked immunosorbent assay (ELISA – total IgE) kits manufactured by Alkar-bio, Russia.

Respiratory function was determined by spirography. Patients with ABG are characterized by a labile type of bronchoconstriction, which manifests as an increased bronchial muscle response to various triggers.

To determine the functional state of bronchial responses in ABG, we used a bronchial lability test. For this test, we recorded baseline FVC I at rest, then 5-6 minutes after physical exertion (20-25 squats). The bronchial lability index was then calculated using the following formula:

PE = decreased FVC in liters after exercise/predicted FVC (in liters) × 100%

Results and expectations: Certain clinical features of the disease were identified in children with AHB.

In the study group, compared to the comparison group (AR without hypertension), severe nasal congestion was observed in 38 (78%) children. Nasal rhinorrhea was predominantly mucous (84%), while in the comparison group (AR without hypertension), watery nasal discharge was more common (80%).

Patients in the study group more often experienced posterior rhinorrhea, accompanied by a severe cough.

Analysis of specific diagnostic results revealed that patients with AHB are characterized by hypersensitivity to several allergens. We have found that simultaneous hypersensitivity to 2-3 allergens is found in 17% of patients, 4-6 in 40%, and to 7 and 9 or more in 29%.

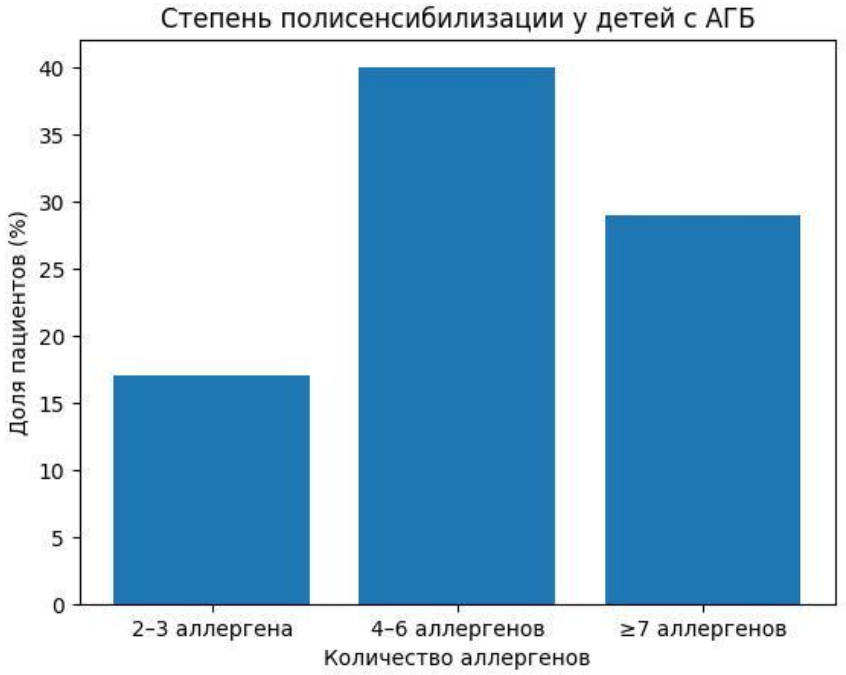

Figure 1. Distribution of children with bronchial hypertension by the number of causative allergens

It should be noted that all patients demonstrated hypersensitivity to multiple allergens, including some that are related in allergenicity and some that are taxonomically distinct.

As noted above, recording FVC I under conditions of artificially induced bronchoconstriction allows us to determine the lability of bronchial smooth muscle and assess its functional state in patients with bronchial hypertension.

In healthy individuals, FVC I ranged from 2.4 to 4.2 liters, with an average of 3.1 liters. After physical exertion, it decreased by an average of 100 ml (from 50 to 200 ml).

In patients with bronchial hypertension, FVC I at rest averaged 1.8-2.8 liters, i.e., it was 20-500 ml lower than in those without bronchial hypertension.

After physical exertion, FVC I decreased by an average of 365 ± 4.0 (from 100 to 600 ml); the muscular factor of bronchial obstruction dominates, and high bronchial lability is revealed.

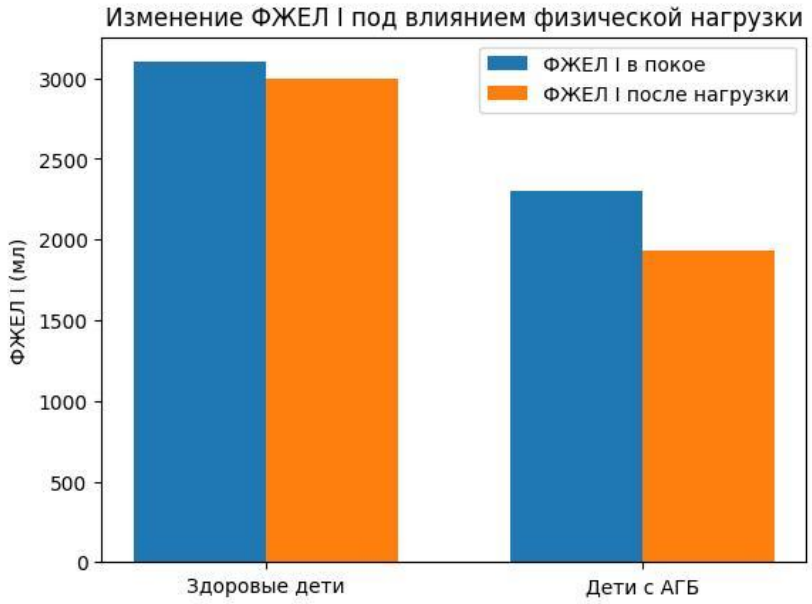

Figure 2. Changes in FVC I values at rest and after exercise in healthy children and patients with bronchial hyperactivity disorder (AHB).

Against the background of reduced experiential volume, the lability index is low.

Consequently, high lability indices indicate increased reactivity of the bronchial neuromuscular apparatus in patients with AHB.

Thus, AHB is a complex form of allergic rhinitis that requires a new treatment approach. With combined sensitization caused by exposure to multiple genetogenic allergens, there is a tendency for bronchial obstruction to worsen.

Timely diagnosis of AHB and appropriate treatment prevents the development of bronchial asthma.

Conclusion: The study showed that allergic rhinitis complicated by bronchial hyperreactivity is characterized by a more severe and clinically unfavorable course compared to isolated allergic rhinitis. Children with ABG typically experience severe nasal congestion, predominantly mucous rhinorrhea, frequent posterior rhinorrhea, and cough syndrome, indicating lower respiratory tract involvement.

Allergy diagnostics revealed that most patients with ABG exhibit severe polysensitivity. The most common findings were simultaneous hypersensitivity to 4-6 and 7 or more causative allergens, including both related and taxonomically distant allergens. Combined sensitization is accompanied by a worsening of the clinical picture and aggravation of bronchial obstruction.

Assessing pulmonary function using a bronchial lability test allowed us to identify latent bronchial obstruction in children with ABH. In this group of patients, baseline FVC I values were significantly lower than in healthy children, and after physical exercise, a significant decrease in FVC I was observed, reflecting the high lability of bronchial smooth muscle and the predominance of the muscular component of bronchial obstruction. High values of bronchial lability indicate increased reactivity of the bronchial neuromuscular apparatus in patients with ABH.

Thus, allergic rhinitis with bronchial hyperreactivity should be considered a complex form of allergic rhinitis, which is in the developmental stage of bronchial asthma. The use of functional stress tests in combination with allergy and immunological research methods is informative and allows for the timely detection of latent bronchial obstruction. Early diagnosis of ABG and pathogenetically based therapy in children with allergic rhinitis have significant prognostic value, as they help prevent disease progression and reduce the risk of developing bronchial asthma.

Practical Relevance:

These results support the inclusion of bronchial lability testing in the evaluation of children with allergic rhinitis, especially in the presence of cough syndrome and signs of polysensitization.

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