

## **DIAGNOSIS AND TREATMENT OF AIRWAY HYPERREACTIVITY IN FREQUENTLY ILL CHILDREN AND ADOLESCENTS**

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**Annotation:** This study is aimed at examining the methods of diagnosing and treating airway hyperreactivity (AHR) in children and adolescents frequently affected by respiratory tract infections. Diagnosis was made based on clinical, spirometric, and provocation tests, and the effectiveness of medications was evaluated. The obtained results made it possible to develop strategies for early detection and effective treatment of AHR.

**Keywords:** airway hyperreactivity, frequently ill children, bronchial hyperresponsiveness, spirometry, treatment.

### **Introduction**

The group of frequently ill children and adolescents (FIC) is prone to respiratory tract pathologies, particularly the development of hyperreactivity syndrome. Airway hyperreactivity (AHR) is considered a key pathogenetic factor in the development of bronchial asthma. The complexity of diagnosing AHR hinders its early detection and the timely implementation of preventive measures. Therefore, an in-depth analysis of modern spirometry, bronchial provocation tests, and methods for evaluating treatment effectiveness is of great relevance in diagnosing AHR.

### **Research objective:**

To identify airway hyperreactivity in frequently ill children and adolescents, improve the diagnostic algorithm, and assess the effectiveness of treatment based on an individualized approach.

### **Materials and Methods**

### **Research base:**

This research was conducted in healthcare institutions of the Fergana region, specifically in a children's polyclinic and the outpatient and inpatient departments of a central hospital. The study was based on patients examined and treated at these facilities between 2023 and 2024. Respiratory pathologies in children, especially bronchial asthma and similar syndromes, were thoroughly studied during the research.

### **Research design:**

The study was observational and prospective. Patients were monitored over a specific period, and changes in their clinical signs were evaluated step by step. This design allowed dynamic observation of the health condition of the participating children and evaluation of their response to treatment.

### **Participants:**

A total of 80 children and adolescents aged 6 to 16 participated in the study. They were divided into two main groups:

- Main group – 50 children with diagnosed bronchial asthma or similar clinical signs (FIC). These children exhibited various degrees of respiratory disorders, allergic conditions, and inflammatory processes.
- Control group – 30 children considered healthy with no clinical symptoms related to the respiratory tract. This group was selected for comparative analysis.

### **Evaluation and diagnostic methods:**

Participants underwent several clinical and instrumental examinations. The evaluation methods included:

1. Clinical examination – analysis of patients' medical history (anamnesis), auscultation of breathing sounds, assessment of symptom frequency (cough, shortness of breath, chest tightness, etc.).
2. Spirometry – used to determine respiratory function indicators:
  - FEV1 (forced expiratory volume in the first second),
  - PEF (peak expiratory flow),
  - FEV1/FVC ratio (important parameter for diagnostic accuracy).
3. Bronchial provocation test – conducted using methacholine. This test helped identify bronchial hyperresponsiveness.
4. Skin allergy test – performed using common aeroallergens to determine the presence of an allergic background.
5. Laboratory tests – blood analysis included the count of eosinophils and the level of total IgE (Immunoglobulin E), which indicate allergic conditions and the degree of inflammation.

### **Treatment approach**

Children diagnosed with airway hyperreactivity (AHR) received targeted medications for three months:

- Inhaled corticosteroids (beclomethasone) – to reduce inflammation and bronchial sensitivity,
- Bronchodilators (salbutamol) – for symptomatic relief, i.e., to widen the airways.

### **Observation and monitoring:**

To evaluate treatment effectiveness, patients were monitored for three months with planned follow-ups. At the end of the 1st, 2nd, and 3rd months, they underwent re-examinations. At each

follow-up stage, changes in clinical condition, spirometric indicators, and laboratory results were assessed.

## **Research Results**

During the study, the clinical and laboratory indicators of 50 children from the FIC group (with signs of bronchial disease) were analyzed. Key results included:

- Airway hyperreactivity (AHR) signs were found in 38 out of 50 children in the FIC group, constituting 76% of participants. This shows the widespread occurrence of AHR among children.
- According to spirometry results, the FEV1 level was below 80% in 30 children, making up 60% of the group. This indicates reduced pulmonary ventilation and the presence of obstructive changes.
- A positive result in the methacholine bronchial provocation test was observed in 32 children, accounting for 64% of participants, confirming the high prevalence of bronchial hyperresponsiveness.
- Another important indicator of allergic background – elevated total IgE levels – was found in 28 children, or 56% of the participants, indicating a predisposition to allergies.

### **Post-treatment condition (by the end of 3rd month):**

The three-month treatment course with beclomethasone (inhaled corticosteroid) and salbutamol (bronchodilator) showed effectiveness, as evidenced by the following results:

- Clinical symptoms (cough, shortness of breath, chest tightness, etc.) significantly decreased during treatment. By the end of the 3rd month, symptom frequency had decreased by approximately 70%.
- Spirometric indicators significantly improved: FEV1 levels normalized in most patients. The average FEV1 values reached 85–95%, indicating improved lung function.
- The need for salbutamol decreased considerably, showing that symptoms were no longer recurring frequently and that treatment was effective.

## **Discussion**

The study results showed a high likelihood of AHR in the FIC group. In particular, children with a family history of allergies, exudative diathesis, or atopic dermatitis had higher AHR rates. Spirometry and bronchial provocation tests are of great importance in diagnosing AHR. The combination of inhaled corticosteroids and bronchodilators proved effective in reducing symptoms and improving functional parameters.

## **Conclusion**

The obtained results indicate that spirometry and bronchial provocation tests are important diagnostic tools for the early detection of airway hyperreactivity (AHR) in frequently ill children. These tests enable the identification of AHR even in cases with unclear symptoms but recurring respiratory infections.

Furthermore, inhalation therapy — particularly the combination of corticosteroids and bronchodilators — has demonstrated high effectiveness in reducing symptoms of respiratory insufficiency in patients with AHR and preventing disease recurrence. Significant improvement in spirometric indicators and overall quality of life was observed during treatment.

In addition, the early detection and treatment of patients with AHR based on a personalized approach play an essential preventive role in preserving long-term health, especially in preventing the development of bronchial asthma. This creates an opportunity to improve the strategy for preventing chronic respiratory diseases from early childhood.

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