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# PATIENTS WITH POLYPOUS FORM OF ALLERGIC RHINOSINUSITIS AND BRONCHIAL ASTHMA

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**Abstract**

In recent years, the relationship and co-occurrence of perennial allergic rhinosinusitis (AR) and bronchial asthma (BA) have received significant attention worldwide. The relevance of this problem is due to many factors, the most significant of which are the high prevalence of the combination of year-round AR and BA, the virtually ubiquitous annual increase in the number of patients with this pathology, its significant impact on social activity and quality of life, and the significant financial costs associated with the treatment of this category of patients. Since the beginning of the study of the relationship between the upper and lower respiratory tract, it has been proven that they represent a single whole in structural and functional terms. This is confirmed by the mutual influence of AR and BA. The great significance of sensitization foci in the upper respiratory tract on the development and course of BA has been confirmed. In the case of a combination of year-round AR and BA, the condition of the respiratory epithelium of the nasal cavity depends not only on local pathological changes, but also on the nature and extent of damage to the lower respiratory tract. Similarly, the function of the bronchial respiratory epithelium is determined not only by local factors, but also by the severity of rhinosinusitis and its type. Parallelism of cellular reactions occurring at different levels of the respiratory tract has been demonstrated, as well as a relationship between changes in respiratory function indices and the increasing severity and prevalence of allergic inflammation in the nasal cavity and paranasal sinuses (PNS). There is clear evidence that irritation of the " asthmogenic zones" of the nasal cavity by polyps, pathological discharge, or surgical instruments during surgery leads to increased impulses along the rhinobronchial reflex chain, which causes impaired bronchial

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motility. Treatment of year-round AR with endonasal topical glucocorticosteroids does not always improve the course of asthma, but it reduces bronchial hyperreactivity and eosinophilia. Oronchoalveolar nitric oxide, and hydrogen peroxide concentrations in exhaled breath condensate. The potency of year-round af and ba pathogenesis is confirmed by the improvement in nasal breathing during treatment of patients suffering from edematous AR and BA with leukotriene receptor antagonists, which were initially intended to be used only as anti-asthmatic drugs.

However, despite the availability of numerous treatments for AR in patients with asthma (corticosteroids, leukotriene receptor antagonists), there is still no clarity regarding the choice of a particular drug. There are no clear recommendations on what diagnostic procedures should be performed before prescribing a specific endonasal topical or leukotriene receptor blocker. There is no clear information on whether and to what extent a particular drug, for example, zafirlukast, is effective. Reduce the volume of polypous tissue in a certain category of patients. There are no data on how respiratory rate parameters change in patients with year-round AR and BA after the administration of endonasal topical steroids.

Thus, 80-98% of patients with BA have AR, and up to 40-56% of patients with rhinitis have BA. It has been found that AR precedes BA in the majority of cases (32-64%) and is a risk factor for its development. AR is often underdiagnosed in clinical practice. The time from the onset of symptoms to diagnosis of AR is 4 to 8.5 years. In 2021, members of the WHO expert working group adopted the "Allergic Rhinitis and its Impact on Asthma" (ARIA) program, which identified the main challenges in the diagnosis and treatment of AR. The relationship between AR and asthma is the subject of intensive research. In recent years, three most likely mechanisms for this interaction have been identified: the shutdown of the physiological function of the nose, the rhinobronchial reflex, and the so-called "inflammatory" reflex. However, the condition of the lower respiratory tract in patients with AR without asthma remains poorly understood. Further research is needed to understand how AR and asthma influence each other's course and patients' quality of life.

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**The aim of the work:** to study the relationship between the upper and lower respiratory tract in patients with allergic rhinitis and bronchial asthma in order to optimize the treatment of these diseases.

**Research objectives**

To determine bronchial patency and bronchial hyperreactivity to acetylcholine in patients with allergic rhinitis without bronchial asthma. To study the content of hydrogen peroxide in exhaled air condensate in patients with allergic rhinitis, with and without clinical symptoms of bronchial asthma. To assess the impact of allergic rhinitis on the quality of life of patients with bronchial asthma and its course. To study the impact of bronchial asthma on the course of allergic rhinitis and the quality of life of patients with this disease. To study the effect of modern antihistamines and nasal glucocorticoids on the course of allergic rhinitis and bronchial asthma. To evaluate the effect of inhaled glucocorticoids on the course of allergic rhinitis.

**Study results**

Subclinical lower respiratory tract inflammation has been demonstrated for the first time in patients with allergic rhinitis without asthma. It has been established for the first time that allergic rhinitis contributes to the severity of asthma, and asthma contributes to the severity of rhinitis. It has been shown for the first time that antihistamines and nasal glucocorticoids, by reducing the severity of allergic rhinitis symptoms, improve the quality of life in patients with concomitant asthma. It has been shown for the first time that inhaled steroids can reduce the severity of some allergic rhinitis symptoms. It has been shown that lower respiratory tract examination is necessary in patients with allergic rhinitis to detect asthma. The need for treating allergic rhinitis with modern antihistamines and nasal glucocorticoids to improve the course of concomitant asthma has been demonstrated.

Patients with allergic rhinitis without asthma have subclinical inflammation of the lower respiratory tract. The combination of allergic rhinitis and asthma adversely affects the course of each disease. Treatment of allergic rhinitis with

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modern antihistamines and nasal glucocorticoids improves the course of concomitant asthma. The inhaled glucocorticoid budesonide, prescribed to patients with asthma and allergic rhinitis, can reduce the severity of individual rhinitis symptoms. Bronchial asthma (BA) and allergic rhinitis (AR) are the most common conditions, accounting for a large share of overall morbidity and causes of disability among allergic diseases.

According to World Health Organization (WHO) statistics, hundreds of millions of people worldwide suffer from allergic rhinitis (AR), with approximately 300 million people suffering from asthma worldwide. Epidemiological studies predict that by 2025, the number of asthma patients will increase by another 100 million. Data from domestic epidemiological studies also indicate an increase in the prevalence of asthma. According to the Respiratory Society, approximately 7 million people currently suffer from asthma, but only 1 million are registered with pulmonologists. The prevalence of AR among the adult population, according to studies conducted using standardized international questionnaires, ranges from 3.4% to 10.6%. Official statistics on the prevalence of AR, based on patient visits, are tens of times lower than the actual values. Long-term epidemiological studies show a progressive increase in the number of people suffering from allergic rhinitis. The prevalence of allergic rhinitis varies from 12.7% to 24% in different regions. Bronchial asthma and allergic rhinitis are chronic diseases that require ongoing, lifelong treatment and preventive measures, which is accompanied by significant financial costs for the healthcare system, patients, their families, and society as a whole. In addition, the medical, social, and economic significance of asthma is associated with temporary loss of ability to work and physical activity of patients, disability, and asthma-related mortality. Economic losses caused by asthma exceed those of tuberculosis and HIV/AIDS combined. The mortality rate from asthma is of great importance, since it indirectly reflects the state of disease control. Worldwide, approximately 250,000 people out of 300 million people with asthma die each year. In 2007, 3,333 people died from asthma, and the mortality rate was 2.3 per 100,000 population (in the USA - 0.4). In 50-80% of cases, asthma is combined with allergic rhinitis. These patients were significantly more likely than those with isolated asthma to have drug and food allergies, pollen

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sensitization, concomitant upper respiratory tract pathology, and a family history of allergic rhinitis. Most of these patients have uncontrolled asthma. The frequent combination of asthma and rhinitis suggests the concept of "one airway, one disease." Therefore, allergic rhinitis should be considered a risk factor for the development of one of the most severe allergic diseases—asthma.

Despite all the advances in asthma management, many patients still experience poor asthma control, and their quality of life remains low. Some researchers attribute this to irregular and untimely adherence to medical prescriptions, particularly for inhaled medications (IMS); only 15% of patients use their asthma medications correctly. Even in large cities and regional centers, the quality of asthma diagnosis and treatment in outpatient settings remains low. The increasing prevalence of uncontrolled asthma, in turn, increases the direct costs associated with expensive medical care, such as emergency medical care and inpatient treatment. In 2021, members of a WHO working group developed the ARIA program, which summarizes current understanding of allergic rhinitis, proposes a new classification of AR, highlights the relationship between AR and asthma, and the deterioration in quality of life in patients with AR. It also presents a methodology for primary, secondary, and tertiary AR prevention based on the principles of evidence-based medicine.

ARIA and GINA have developed a stepwise approach to achieving disease control, which for both AR and BA involves increasing the amount of therapy when disease control is insufficient and decreasing the amount of therapy (to the minimum necessary) when control is achieved. According to some data, only 50% of patients with a confirmed diagnosis of AR receive adequate antiallergic therapy. When AR and BA symptoms persist, the drugs of choice are intranasal and inhaled glucocorticosteroids , which have a potent anti-inflammatory effect, antileukotriene agonists (ALA), and long-acting B2-agonists (LABA), which have a round-the-clock bronchodilatory effect in BA. In cases where control is not achieved in patients with moderate to severe persistent BA using medium/high doses of ICS and LABA, then leukotriene receptor antagonists (LAA) are recommended to be added to the treatment in steps 3-4 . ALS are also recommended for the treatment of AR.

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By affecting two inflammatory pathways— prostacyclin and leukotriene —ICS and ALS, when administered simultaneously, have a complementary effect, allowing for a more pronounced anti-inflammatory and, consequently, clinical effect and improved quality of life in children and adults while reducing the ICS dose. Important compliance -enhancing advantages of ALS include its tablet form, convenient once-daily dosing, and good tolerability. The clinical efficacy of montelukast in patients with asthma and allergic rhinitis has been demonstrated in domestic studies. For the treatment of asthma, patients diagnosed with asthma receive free ILS under the "affordable drugs" program and "vital drugs" from regional and federal budgets. ALS are not included in the list of drugs received by patients under these programs and are unaffordable for most patients, limiting their widespread use. The clinical efficacy of ALS in isolated BA, AR, and the combination of BA and AR has been well studied. However, the pharmacoeconomic aspects of combination therapy with ICS and ALS in BA combined with AR have been insufficiently studied. This may be useful for justifying the inclusion of this group of drugs in the list of medications for subsidized provision to patients with asthma. Thus, the high prevalence of AR and BA, the severity of the disease, often due to the combination of these diseases, insufficient control of AR and BA symptoms, and the associated significant financial losses to the state and individuals necessitate further epidemiological and clinical-economic studies on AR and BA. The anti-inflammatory effect of ALS in the upper and lower respiratory tract, potentiated by topical GCS, is an important means of increasing the effectiveness of treatment for patients with BA combined with AR and, possibly, a way to reduce treatment costs, which requires confirmation through clinical-economic analysis.

## Conclusions

The overall incidence rate does not reflect the actual number of patients with allergic rhinitis and bronchial asthma in the population: in 2022, the number of patients with AR in Lesnoy according to the data on consultations (overall incidence) was 164 times less, and the number of patients with bronchial asthma was 7 times less than according to the data on the prevalence of AR and BA,

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respectively. Mortality and morbidity rates caused by bronchial asthma tend to improve against the background of increasing availability of ALL for asthma patients: since 2010, primary disability has decreased to 0; since 2021, the number of emergency medical service calls has decreased by 1.5 times; In 2022, the number of hospitalizations decreased by 1.2 times, and asthma-related mortality dropped to 0. The prevalence of allergic rhinitis and bronchial asthma in 2012 was 17.1% and 8.9%, respectively. Women were 4.7 times more likely to have bronchial asthma and 1.8 times more likely to have allergic rhinitis than men. The prevalence of bronchial asthma has increased by 1.6 times over the past 10 years. The most significant risk factors for AR and BA were: having immediate relatives with asthma and allergies, and having pets, birds, and an aquarium with fish in the home. Clinical and allergological characteristics of patients with bronchial asthma identified in the population study differed from patients with bronchial asthma from the registry: in the population, patients with mild asthma (87.5%) were 7 times more common than with moderate and severe asthma (12.5%); atopic bronchial asthma prevailed in 73% of cases; household sensitization prevailed in 63% of patients with bronchial asthma; the proportion of asthma patients with concomitant allergic rhinitis and/or nasal polyposis was 48%. In the population, mild AR (66%) was 1.9 times more common than moderate asthma (34%); intermittent asthma was observed in 53% of cases, persistent asthma - in 47% of cases; pollen sensitization prevailed in 68% of patients with allergic rhinitis. The inclusion of montelukast in the background therapy of persistent bronchial asthma of moderate/severe course in combination with allergic rhinitis resulted in a decrease in rhinitis symptoms, a significant increase in the forced expiratory volume in the first second, the average number of days without asthma symptoms, a decrease in the need for topical adrenergic agonists , and improved asthma control with a 2-fold decrease in the dose of topical glucocorticosteroids . In the structure of direct costs for the management of patients with BA in combination with AR, the share of expenses on outpatient drug therapy was 94.2-92.3%; the inclusion of leukotriene receptor antagonists in therapy reduced the costs of ALT by 16.4%, and direct costs in general by 21.2%. A pharmacoeconomic analysis using the cost/effectiveness method showed better

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dynamics (2.2 times) of reduction in direct costs per unit of effectiveness (asthma symptom-free days) in the treatment of patients with moderate to severe persistent asthma combined with allergic rhinitis with montelukast than in patients in the comparison group.

**Practical recommendations**

To optimize care for patients with AR and BA, it is recommended to conduct a study on the prevalence of allergic respiratory diseases over time. For the creation and maintenance of a registry of AR and BA patients, it is advisable (due to its accessibility and ease of management) to use a Microsoft spreadsheet program. Excel. To enhance the clinical and economic benefits of therapy in patients with moderate to severe asthma combined with allergic rhinitis, it is recommended to add ALS to topical glucocorticosteroids. When conducting pharmacoeconomic analysis, it is advisable to use the number of asthma-free days as the unit of effectiveness. To improve the availability of ALS for patients with asthma, it is recommended to include ALS in the subsidized drug provision program.

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