CLINICAL AND EPIDEMIOLOGICAL FEATURES OF ALLERGIC RHINITIS IN CHILDREN OF THE REPUBLIC OF KARAKALPAKSTAN

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Abstract. *Allergic rhinitis is one of the most common chronic allergic diseases in children and represents a significant medical and social problem, particularly in regions with unfavorable environmental conditions. The aim of this study was to investigate the clinical and epidemiological characteristics of allergic rhinitis in children of the Republic of Karakalpakstan and to evaluate the impact of environmental factors on the course of the disease.*

The study included 86 children aged 5 to 17 years diagnosed with allergic rhinitis. All patients underwent clinical examination, collection of allergological history, anterior rhinoscopy, and laboratory investigations including eosinophil count and total IgE level assessment.

The study demonstrated that school-aged children and boys predominated among the examined patients. The most common clinical manifestations included nasal obstruction, paroxysmal sneezing, rhinorrhea, and nasal itching. Elevated total IgE levels and eosinophilia were identified in the majority of patients, confirming the IgE-mediated nature of the disease. A high prevalence of persistent and moderate-to-severe forms of allergic rhinitis was revealed. Environmental factors specific to the region, particularly dust storms, high air dustiness, and pollen sensitization, played a significant role in the development and exacerbation of the disease.

Keywords: *allergic rhinitis; children; Republic of Karakalpakstan; atopy; IgE; eosinophilia; pollen allergens; Aral Sea region ecology; allergic diseases; pediatrics.*

Introduction

Allergic rhinitis is an allergic disease caused by exposure to various allergens and characterized by IgE-mediated inflammation of the nasal mucosa. The condition is primarily manifested by profuse nasal discharge, episodes of sneezing, and impaired nasal breathing, often accompanied by a reduced sense of smell [1].

According to current epidemiological data, the prevalence of allergic diseases in economically developed countries continues to increase and currently affects approximately 25–30% of the population [2]. Atopic disorders are the most common allergic conditions. Various studies indicate that allergic rhinitis affects approximately 10–15% of the population, atopic dermatitis about 10%, allergic urticaria nearly 10%, and allergic bronchial asthma occurs in 5–10% of cases [1, 2].

The incidence of allergic diseases largely depends on the patient’s age. Food allergies and atopic dermatitis are more common in infancy and early childhood, whereas allergic rhinitis and bronchial asthma are more frequently diagnosed in adolescents and adults. In elderly individuals, the severity of atopic manifestations usually decreases.

In addition, differences in the prevalence of allergic diseases are associated with living conditions. Urban residents suffer from allergic diseases significantly more often than rural populations, and the incidence is higher in industrial regions compared to environmentally favorable areas [3]. In recent years, a steady increase in the number of patients with allergic diseases has been observed in many industrially developed countries.

Objective

To investigate the clinical and epidemiological characteristics of allergic rhinitis in children of the Republic of Karakalpakstan, identify the major risk factors for disease development, and assess the influence of regional environmental conditions on the course of allergic rhinitis.

Materials and Methods

The study was conducted among children with allergic rhinitis who underwent examination and treatment in pediatric healthcare institutions of the Republic of Karakalpakstan during 2024–2025.

The study included 86 children aged 5 to 17 years with a confirmed diagnosis of allergic rhinitis. The diagnosis was established based on patient complaints, medical history, clinical examination, and laboratory and instrumental diagnostic methods.

All children underwent:

- collection of allergological history;
- clinical examination;
- anterior rhinoscopy;
- complete blood count;
- determination of eosinophil levels;
- assessment of total immunoglobulin E (IgE);
- consultation with an allergist.

Additionally, the following factors were evaluated:

- seasonality of symptoms;
- hereditary predisposition;
- household and environmental factors;
- presence of concomitant allergic diseases.

Statistical analysis was performed using methods of variation statistics.

Results and Discussion

Analysis of the clinical and anamnestic data of 86 children with allergic rhinitis in the Republic of Karakalpakstan revealed that middle school-aged children (11–14 years) predominated among the examined patients, accounting for 42% (n=36). A slight predominance of boys (58%, n=50) over girls (42%, n=36) was observed, which is consistent with global data indicating a higher prevalence of atopy among males during childhood [5].

Anterior rhinoscopy demonstrated a typical clinical picture in the majority of patients (82.5%):

- edema and pallor (cyanosis) of the nasal turbinate mucosa;
- abundant serous-mucous nasal discharge;
- narrowing of the nasal passages.

The main complaints were distributed as follows: nasal obstruction (94%), paroxysmal sneezing (88%), nasal itching (72%), and rhinorrhea (85%). Extranasal symptoms, including

lacrimation and eyelid itching, were observed in 34% of children, indicating a high association between allergic rhinitis and allergic conjunctivitis [6].

Table 1. Analysis of laboratory markers confirmed the presence of a systemic allergic reaction

Indicator	**Mean value (M±m)**	**Frequency of abnormalities (%)**
Peripheral blood eosinophils	7.4 ± 1.2%	68.6%
Total IgE (IU/mL)	342.8 ± 45.5	81.4%

Elevated total IgE levels correlated with disease severity ($r = 0.64$; $p < 0.05$), confirming the IgE-mediated mechanism of pathology development in the majority of examined patients [7].

Hereditary predisposition (presence of allergic diseases in parents or siblings) was identified in 62.8% of children. Concomitant allergic conditions were diagnosed in 45% of the examined patients:

1. Bronchial asthma — 28% (“allergic march” phenomenon) [8];
2. Atopic dermatitis — 17%.

According to the ARIA (Allergic Rhinitis and its Impact on Asthma) classification, the examined children (n=86) were distributed as follows [4]:

- Persistent allergic rhinitis (symptoms more than 4 days per week) was identified in 64% (n=55) of children, while intermittent allergic rhinitis was diagnosed in 36% (n=31).
- Moderate and severe disease severity was recorded in 72% of patients, which significantly exceeds global average indicators and may reflect delayed medical consultation or aggressive environmental exposure in Karakalpakstan.

Collection of allergological history revealed key provoking factors specific to the region:

1. Climatic factor: 89% of parents reported worsening of symptoms during periods of dust storms and increased winds characteristic of the Aral Sea region.
2. Household allergens: sensitivity to house dust was identified in 48% of children.
3. Pollen sensitization: exacerbations during the spring-summer period (wormwood, goosefoot, grasses) were noted in 52% of examined patients.

Correlation analysis demonstrated a strong direct relationship between total IgE levels and disease duration ($r = 0.72$; $p < 0.01$).

Particular attention was paid to seasonality: in 56% of children, symptoms persisted throughout the year with periods of exacerbation, which under the conditions of Karakalpakstan is associated with high atmospheric dust levels and specific climatic factors [9].

The obtained results confirm the overall trend toward increasing prevalence of allergic rhinitis among the pediatric population. However, the regional characteristics of the Republic of Karakalpakstan make a specific contribution to the pathogenesis of the disease.

Conclusion

The conducted study made it possible to identify a specific regional profile of allergic rhinitis in children living in the Republic of Karakalpakstan. The obtained data indicate that the disease structure in the region significantly differs from global average indicators due to a higher proportion of severe and persistent forms (72%), which directly correlates with the unfavorable environmental conditions of the Aral Sea region [9].

Main conclusions of the study:

1. Environmental contribution: Specific climatic phenomena, particularly dust storms, were identified as the leading provoking factor of exacerbations by 89% of participants. This confirms the role of fine saline dust particles as a powerful adjuvant enhancing allergic inflammation of the nasal mucosa.
2. Immunological burden: High levels of total IgE and pronounced eosinophilia in the majority of examined patients confirm the classical atopic nature of the disease; however, the intensity of these indicators suggests constant antigenic pressure from the environment.
3. High risk of disability: The considerable prevalence of concomitant bronchial asthma (28%) within the framework of the “allergic march” highlights the need for early diagnosis and intensive treatment of allergic rhinitis to prevent the development of severe obstructive pulmonary diseases [8].

Recommendations

The results indicate the necessity of developing and implementing specialized regional protocols for patient management. Preventive measures in Karakalpakstan should include not only standard elimination of household allergens but also mandatory use of barrier protective measures for mucous membranes during periods of dust storms, as well as enhanced hydration of the respiratory tract. The forecast for 2024–2025 suggests a persistent upward trend in atopy prevalence, necessitating long-term monitoring of the immunological status of the pediatric population in the region.

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