

Comparative Analysis of the Spectrum of Sensitization to Air Allergens in Patients with Respiratory Allergoses from the Republic of Karakalpakstan

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Article History	Abstract
<p>Received: 06 June 2023 Revised: 07 Sept 2023 Accepted: 22 Oct 2023</p>	<p>Background: It has been known for a long time that the prevalence of allergy pathology throughout the world has been steadily increasing, this determines the need for regular screening epidemiological studies; high-quality allergy diagnostics makes it possible to identify the disease in the early stages of development, carry out timely selection of drug pathogenetic therapy, which, in turn, helps to significantly reduce the risk of exacerbation of an allergic disease and the onset of more severe forms of allergopathology. The general patterns of the formation of respiratory allergies include the age-related dynamics of the spectrum, the development of polysensitization, as well as the hierarchical value of aeroallergens. Purpose of the study: to study the spectrum of sensitization in people with respiratory allergies: allergic rhinitis (AR), bronchial asthma (BA) of varying severity, atopic dermatitis (AD) in the Republic of Karakalpakstan, which is characterized by a long period of flowering of weeds (wormwood, solyanka, quino) - end of August end of November, cereal grasses (timothy, foxtail, rye, bluegrass). - end of February - end of July; The duration of flowering is related to the peculiarities of climatic and geographical conditions. Materials and methods: from January to May 2022, a clinical allergological examination was carried out on 120 patients with allergic diseases: of them 90 children aged 2-18 years, 36 children with AR, 24 with BA, 30 children with AD and 30 adult patients, 12 with AR, 12 with AD, 6 with AD. To study the total concentration in blood serum, we used Monocyte test systems manufactured in the USA; Allergen-specific IgE was determined using Alkor Bio test systems manufactured in Russia; standard diagnostic allergens were used for skin prick testing (JSC NPO Microgen, Stavropol). Results: In 75% of patients, combined sensitization to pollen, household and food allergens, 20% only to pollen and food allergens of different groups, and 5% have monosensitization to pollen allergens. Conclusion: Spectrum of sensitization to aeroallergens in the studied region of the republic Karakalpakstan is characterized to a greater extent by pollen sensitization in both children and adults with various allergic diseases, with a predominance of multiple sensitizations in all age groups.</p>
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1. Introduction

Respiratory allergoses (atopic dermatitis, allergic rhinitis, bronchial asthma) are a socially significant problem of modern medicine, which is due to its high prevalence, difficulties in treatment, prevention, loss of ability to work at a young and mature age, disability, etc. The prevalence of respiratory allergies (AD, AR and BA) in various countries, including Uzbekistan, is 8-10% among adults, 10-15% among children. The chronic recurrent course of respiratory allergies, often manifesting in early childhood and continuing throughout life, can cause not only disability, but also deaths, which determines the need to study the complex, unclear mechanisms of development of this pathology in order to develop effective

methods for early diagnosis and prevention of such a terrible disease as bronchial asthma. To select the optimal algorithm for early diagnosis of respiratory allergies for the purpose of preventing bronchial asthma. An analysis of world experience will be carried out, the results of prospective scientific projects (GALEN, MeDALL) will be studied and summarized, and federal clinical recommendations for the diagnosis of allergies will be taken into account.

Based on the above, in pursuance of the Decree of the President of the Republic of Uzbekistan No. 3715 "On measures to radically improve the prevention, diagnosis and treatment of allergic diseases" at the Research Institute of Hematology and Blood Transfusion of the Ministry of Health of the Republic of Uzbekistan together with the RNSATS for the first time in Uzbekistan, within the framework of this project, will be studied association of polymorphic markers of key genes of the above systems with respiratory allergies among the population of Uzbekistan and sensitization to the main (major) and less important (minor) components of allergens will be identified and, based on the data obtained, a domestic panel of molecular genetic diagnostic markers will be developed (mapping the patient's allergenic sensitization on molecular level, using purified natural or recombinant allergenic molecules (allergen components) in combination with a PCR panel), predicting the early development and clinical course of bronchial asthma.

A valuable source of information for this project is the world's largest collection of Central Asian flora specimens, the Central Herbarium of Uzbekistan (TASH). The TASH electronic database has become the most important resource for analyzing the characteristics of the geographical distribution of plants. The Republic of Karakalpakstan is located in a geographical region whose most of the territory is occupied by the dried bottom of the Aral Sea. The drying out of the Aral Sea resulted in the formation in its place of a huge salt desert with an area of almost 50 thousand km². The dry bottom of the Aral Sea almost immediately began to be populated by plants. The vegetation of this territory is a combination of saline, rocky and sandy deserts and fragments of tugai communities. There was an increased overgrowth of the territory by galafites (quinoa, solerosa, spartina, wormwood), comb grass and saxaul.

Data on the spectrum of allergic diseases and sensitization to allergens in the republic Karakalpakstan are very limited, which was the reason for conducting this study.

The purpose of the work was to study the spectrum of sensitization to aeroallergens in patients of different age with respiratory allergies (year-round and seasonal allergic rhinitis/ conjunctivitis (AR/AK), bronchial asthma (BA), atopic dermatitis (AD), living in the Republic of Karakalpakstan.

2. Materials And Methods

A clinical study was carried out using a continuous sample of patients registered at the Republican Scientific Specialized Allergy Center from January to May 2022.

According to diagnostic logs and individual diagnostic cards, the results of an allergological examination of 120 patients were assessed, which included the method of skin testing (prick tests) with water-salt extracts of allergens produced by NPO Microgen (Russia) and laboratory diagnostics for the determination of specific immunoglobulins E to household, pollen, food allergens using the ELISA method using diagnostic kits produced by Alkor Bio (Russia). For skin testing, diagnostic allergens of house dust mites and pollen allergens (timothy grass, bulbous bluegrass, wormwood, quinoa) were used; in vitro we studied the level of allergen-specific immunoglobulins E to extracts of food allergens (cow's milk, gluten, egg white, a mixture of nut allergens (hazelnut, almond, coconut, peanut, walnut), to house dust mites d 1- Dermatophagoides pteronyssinus, d 2 - Dermatophagoides farinae, as well as mixed allergens from meadow and weed pollen in the blood serum.

Patients of the study group with different forms of respiratory allergies were distributed by age, nature of the course and severity of the disease (Table 1): there were 90 children aged from 2-18 years old, 36 children with AR, 24 with BA, 30 children with AD and 30 adult patients, 12 with AR, 12 with BA, 6 with AD. Among children 25 patients suffered from intermittent AR, 9 from moderately severe persistent AR, 12. In 12 children, intermittent BA was diagnosed; 7 had mild BA, 13 had moderate severity, and 3 had severe bronchial asthma. 30 children suffered from AD, of which 3 were mild, 19 were moderate degree of severity, 8 severe 14.

12 adult patients were diagnosed with AR, of which 8 were intermittent, 4 were persistent, moderate to severe; 12 patients were diagnosed with asthma, of which 1 had mild, 9 had moderate, and 2 had severe, controlled asthma. 6 adults were diagnosed with AD, of which 2 had a mild course, 3 had a moderate course, and 1 had a severe course.

Table 1. Distribution of patients with respiratory allergies by age, nature of the course and severity of the disease (n=120)

Age of patients	AR		BA				AtD		
	Intermittent current	Persistent current	Light	Medium	Heavy Controlled	Heavy Uncontrolled	Light current	Medium current	Heavy current
2-18 years old n=90	25	11	7	14	3	-	3	19	8
19-65 years old n=30	8	4	1	9	2	-	2	3	1

Statistical processing was carried out using the chi-square test and the goodness-of-fit method of event frequencies calculated using the universal statistical package STADIA 6.0.

3. Results and Discussion

For cutaneous testing positive tests with household allergens were detected in 90 patients (75%), with pollen allergens (timothy grass, bulbous bluegrass, wormwood, quinoa) in 120 patients (100%). Increased levels of specific IgE to food allergens (cow's milk, gluten, egg white, mixture of hazelnut allergens, almonds, coconut, peanuts, walnuts) were detected in 114 patients (95%), including 84 children and 30 adults.

In 75% of patients, sensitization to household allergens was established, in 100% of patients, pollen sensitization - to timothy grass pollen -25%, 95% to meadow grass, 40% wormwood vulgaris, 95% quinoa pollen, in 60% of patients to house dust mites d 1-Dermatophagoides pteronyssinus, y 50% to house dust mites with. 2-Dermatophagoides farinae, in 82% of patients with ATD - to house dust allergen. In 22% of patients, sensitization was latent.

Table 2 Results of determination of allergen-specific IgE antibodies in the examined patients (n=120)

№	Type of allergen	Number of sensitized patients 2-18 years old, n=90	Number of sensitized adult patients n=30
1	h 1 - (Greer Labs, Inc) House dust	10	2
2	d 1 - Dermatophagoides pteronyssinus	9	3
3	d 2 - Dermatophagoides farinae	8	2
4	g 6 – Timothy meadow (Phleum pratense)	3	2
5	g 8 - Meadow Bluegrass (Poap ratensis)	15	4
6	w 6 - Common wormwood (Artemisia vulgaris)	6	2
7	w 15 - Quinoa (Atriplex lentiformis)	15	4
8	f 2- Cow's milk	13	3
9	f 79- Gluten	2	0
10	f 1- Egg white	12	3
11	fm 61- A mixture of allergens nuts (f13-f17-f20-f36-f256) peanuts, hazelnuts, almonds, coconut, walnut	14	4

Our data indicate that in the study group of patients from the Republic of Karakalpakstan, according to the results of laboratory diagnostics, sensitization to pollen allergens was detected in 100% of patients, of which 25% to the timothy grass allergen (6), 95% to the meadow grass allergen (d 8), 40% to the wormwood allergen (w 6), 95% to the quinoa allergen (w 15), 60% to the house dust allergen (w 1), 50% to the house dust mite allergen (d1 Dermatophagoides pteronyssinus) , in 82% 2 (Dermatophagoides farinae); to food allergens in 80% to cow's milk (†2), in 10% to gluten (f79), in 75% to egg white († 1), in 90% to a mixture of nut allergens fm 61 (f13- f17-120- 136-1256). The

results of skin allergy testing with household and pollen allergens coincided with the results of laboratory examination in 95% of cases.

95% of the examined patients had polysensitization (various combinations to pollen were identified sensitization to pollen, household and food allergens), 5% have monosensitization of weeds (wormwood, quinoa).

The general spectrum of sensitization of the examined patients, taking into account the disease, is shown in Fig. 1, 2.

Figure 1

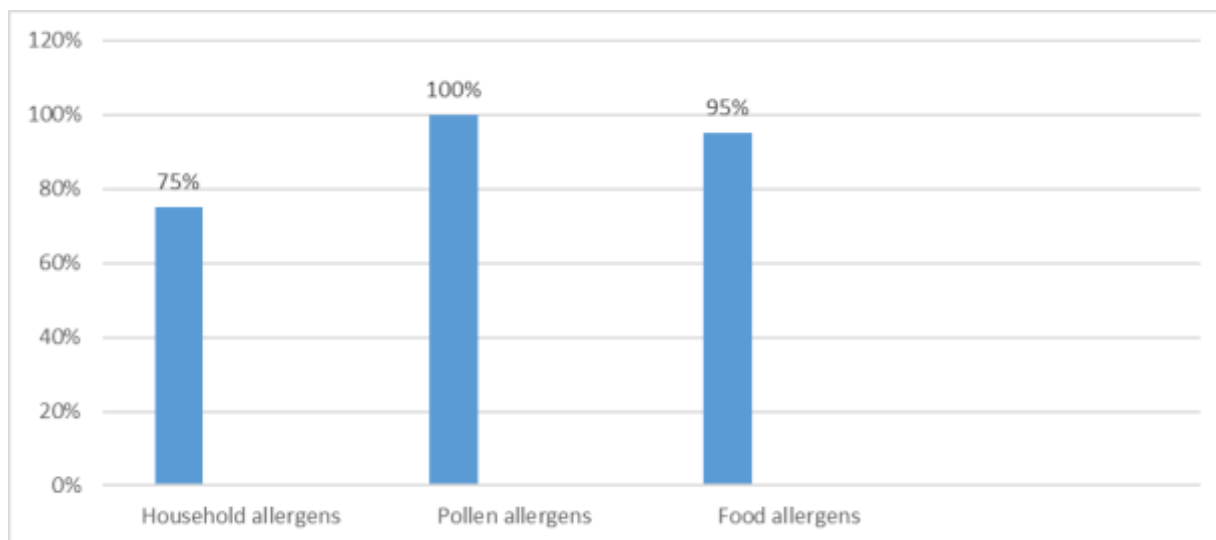


Fig.1. Spectrum of sensitization of patients with respiratory allergies in the Republic Karakalpakstan (n=120)

Figure 2

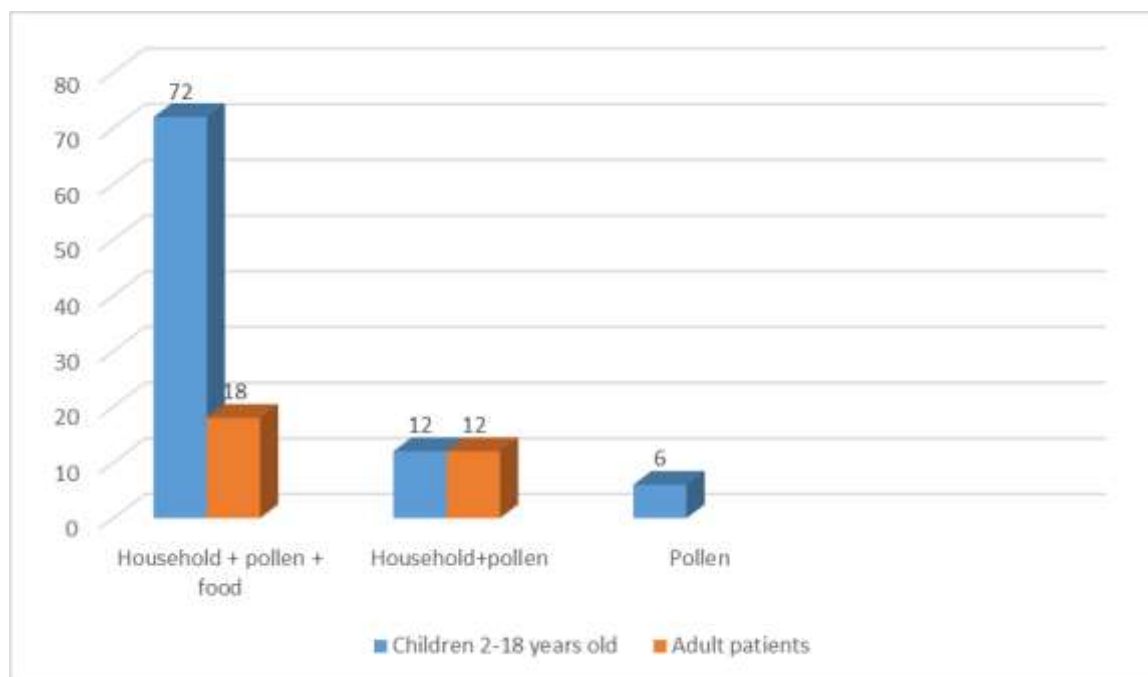


Fig.2. Spectrum of sensitization and nature of clinical symptoms in patients with respiratory allergies in the Republic of Karakalpakstan (n=120)

Sensitization to allergens of weed and meadow grass pollen was detected in all patients of the study group. Sensitization to household allergens was detected in 90 (75%) patients, in children the figure was 72 (60%), in adults 18 (15%), among them symptoms of AR in 31 (26%) patients, asthma - in 30 (25%) patients, AD 29 (24%) patients. Monosensitization to pollen allergens was detected only among children of the study group (Fig. 4). Among adults, sensitization to several groups of allergens was detected in all patients of the study group, and among children this figure was 93% (Fig.3.).

Figure 3

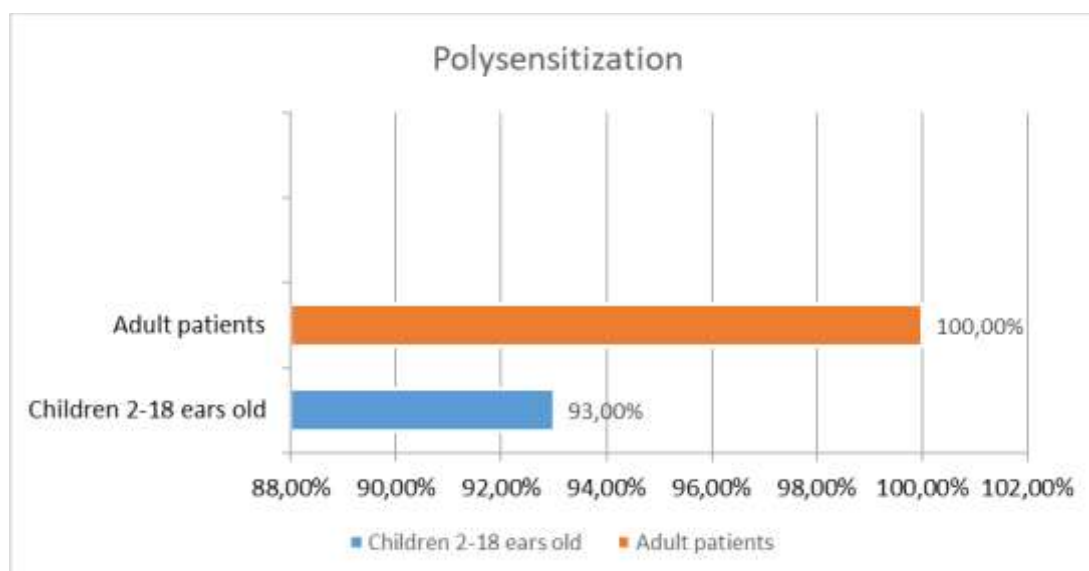


Fig.3. Frequency of polysensitization (n=120)

Thus, the spectrum of sensitization to allergens in patients with allergic diseases in the Republic of Karakalpakstan is characterized by a predominance of pollen allergens in children and adults with a significant proportion of polysensitized patients in all age groups.

In patients with persistent respiratory allergic symptoms (BA, AR), regardless of age, the group of pollen allergens significantly more often dominated in the structure of sensitization. Patients with intermittent allergic diseases (SAR/AD) in the vast majority of cases (more than 97%) had pollen sensitization. The proportion of polyvalent sensitization in patients did not depend on the nosological form of the allergic disease and was detected in 114 patients, among them all adults and 93% of children.

The combination of pollen and food sensitization in children and adults occurs with the same frequency. The combination of pollen and household sensitization occurs 20% more in children than in adults. The results of in vitro allergy diagnostics coincided with the results of skin tests in 90% of patients with a predominance of polysensitization to different groups of allergens (95%) over monosensitization (5%).

Our study gives an idea of the spectrum of allergic diseases and sensitization in 120 patients from the Republic of Karakalpakstan. According to a clinical study using a continuous sample of patients enrolled in a specialized allergy center from January to May 2022, the results of an allergological examination in vivo (skin testing) and in vitro (determination of antibodies to allergens) were analyzed and sensitization to pollen allergens in 100% of patients, of which 25% to timothy grass allergen (g 6), 95% to meadow grass allergen (g8), 40% to common wormwood allergen (w 6), 95% to quinoa allergen (w 15), in 60% to the house dust allergen (h 1), in 50% to the house dust mite allergen (d1 Dermatophagoides pteronyssinus), in 82% ka 2 (Dermatophagoides farinae); to food allergens in 80% to cow's milk (f2), in 10% to gluten (179), in 75% to protein (f 1), in 90% to a mixture of nut allergens fm 61 (f13-f17-f20-f36 -1256). AR was detected in 48 patients, BA in 36, and AD in 36. In 6 patients, monosensitization to weed pollen (wormwood, quinoa) was revealed, in 114 patients polysensitization to different groups of pollen and household allergens was revealed.

Clinically, the most severe course was observed in patients with asthma with sensitization to mites house dust. Our data is partially consistent with the results of a study conducted by E. N. Ismailova et al., which showed that children living in the Republic of Uzbekistan show sensitization to all allergenic molecules of grass pollen presented on the Madex chip panel; The most common sensitization was detected to major allergenic molecules of cereal grasses, perennial chaff Lol r. 1 - in 35.53%, timothy grass Phl pT B in 33.7% of cases [15]. Sensitization to tree pollen was less typical of the 30 components presented on the chip; the presence of sensitization in more than 10% of cases was observed only in 9. The profile of sensitization to weed pollen was represented by 17 allergenic components, the most common was sensitization to saltwort extract in 36% of cases; amaranth in 29.6% of cases and wormwood (Art v1) in 25.5%. Sensitization to year-round allergens was not typical for the examined patients; only 5.4% had allergen-specific antibodies to house dust mites, although 34.6% were sensitized to Alternaria alternata molds. In our study, 74% of patients were sensitized to CDP allergens.

Thus, the spectrum of sensitization to aeroallergens in children and adults with allergic diseases in the Republic of Karakalpakstan is characterized by a predominance of sensitization to pollen allergens of weeds and cereals and house dust mites with a significant proportion polysensitization of patients in all age groups.

4. Conclusion

The spectrum of sensitization to aeroallergens in patients with allergic diseases in the studied region of the Republic of Karakalpakstan is characterized to a greater extent by pollen sensitization in both children and adults with various allergic diseases, and with the predominance of multiple sensitization in all age groups.

In the patients we examined, the most common were seasonal and year-round forms of AR, BA, as well as AD and the combination of AR+BA, AR+AD, ATD+BA.

The frequency of polysensitization to various combinations of allergens varied depending on age. Pollen and food sensitization in children and adults occurs with the same frequency. The combination of pollen and household sensitization occurs 20% more in children than in adults.

The dominant group of aeroallergens in the patients we examined was pollen. The dominant group of aeroallergens in the patients we examined was plant pollen (100%), the dominant role in the development of seasonal manifestations of allergies is occupied by pollen from the weed grass wormwood (in 100% of the patients examined), 95% to the meadow grass allergen (9 8), in 40% to the wormwood allergen (w 6), in 95% to the quinoa allergen. Sensitization to weed pollen allergens has been detected with approximately the same frequency in children and adults. Sensitization to household allergens was established in 75% of patients, which characterizes the significant contribution of household sensitization to the development of year-round forms of AR, BA, and AD. Among food allergens, 80% cow's milk, 75% egg white, 90% a mixture of nut allergens deserves special attention; sensitization to them was found in the vast majority of young children with clinical signs of PA.

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Contribution of the authors: Ilmira Razikova — research design, article editing; Nazifa Dustbabayeva — literature review, collection and analysis of literary sources; Farangiz Xasanova, Shaxzoda Xodjayeva — preparation and writing of the text of the article; Nargiza Aidarova, Venera Baybekova — writing of the text and editing of the article. All authors confirm that their authorship meets the international ICMJE criteria (all authors have made a significant contribution to the development of the concept, research and preparation of the article, read and approved the final version before publication).

Author contribution: Ilmira Razikova – edited an article; Nazifa Dustbabayeva, Farangiz Xasanova - conducted a literature review, collected and analyzed literary sources; Venera Baibekova V. F. Baybekova, Shaxzoda Xodjayeva - prepared and wrote the manuscript; Nargiza Aidarova - wrote the manuscript and edited an article. All authors made a substantial contribution to the conception of the work, acquisition, analysis, interpretation of data for the work, drafting and revising the work, final approval of the version to be published and agree to be accountable for all aspects of the work.

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