BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg
BG PULSE JOURNAL

RESULTS OF MOLECULAR ANALYSIS OF SENSITIZATION IN CHILDREN WITH BRONCHIAL ASTHMA LIVING IN THE SYRDARYA REGION

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SUMMARY

The aim of the study. To determine the regional characteristics of the molecular profile of sensitization in children with respiratory allergies in the Syrdarya region of the Republic of Uzbekistan.

Material and methods of the study. The presented research material was obtained from 61 children with bronchial asthma and allergic rhinitis permanently residing in the Syrdarya region to identify the molecular profile characteristic of this region. The study utilized methods of questionnaire survey, clinical, clinical-laboratory, serological, molecular, immunological, and statistical research. All data were entered into Excel format, processed, and presented in the form of diagrams. **Obtained research results and their discussion.** One of the most promising directions in allergology is the development of molecular allergology, which includes the creation of recombinant allergens for accurate diagnosis and effective allergen-specific immunotherapy (ASIT).

Prospects for the development of pediatric allergology are associated with the design and implementation of technologies for clinical trials involving the active introduction of molecular biomarkers into practice.

For the first time, sensitization molecular screening using the ALEX chip was evaluated in children in the Syrdarya region..

Rational treatment and prevention of BA (bronchial asthma) will contribute to the reduction of complications, disability, as well as the reduction of financial and other costs for the patient and the state.

Conclusions. The study of the molecular profile of pollen sensitization revealed that 50% of children have polysensitization in various combinations. Monosensitization was detected in 10% of cases..

The most common and frequent pollen allergen characteristic among children with BA and AR turned out to be Timothy grass Phl p1 in 62%, poplar in 48%, paspalum/noticeable buckwheat – 33.3%, and perennial ryegrass – 29%.

One of the most promising directions in allergology is the development of molecular allergology, which includes the creation of recombinant allergens for accurate diagnosis and effective allergen-specific immunotherapy (ASIT).

Keywords: molecular diagnostics, sensitization, allergen, allergen vaccination, Syrdarya region, respiratory allergic diseases.

Introduction

In order to study the sensitization profile and the impact of anthropogenic factors (changes in the landscape and traditions of keeping domestic animals), as well as to comparatively evaluate gender and age differences, children in the Syrdarya region of the Republic of Uzbekistan were examined.

Epidemiological studies indicate that bronchial asthma develops in early school age. Due to the increasing prevalence of asthma, the lack of new effective methods for treatment and prevention of the disease becomes a problem, increasing the need for prognostic biomarkers. In accordance with current clinical guidelines, it is important to identify sensitization patterns that subsequently lead to the development of asthma.

Bronchial asthma was diagnosed by determining specific IgE in multiplex tests, such as the allergen chip, which allow for the simultaneous determination of specific IgE to a whole spectrum of respiratory allergens [118,148]. At the same time, the sensitivity of molecular diagnostic methods exceeds that of similar tests based on allergen extracts [175,261,268,279], making it ideal for the primary diagnosis of allergic asthma. Moreover, based on previously conducted studies, it appears possible to predict the development of allergic respiratory diseases based on specific IgE detected at an early age [263,268,279].

The results obtained by us on the molecular diagnosis of allergens in children with BA and AR. Studies were conducted in 61 children with BA and allergic rhinitis permanently residing in the Syrdarya region to identify the molecular profile characteristic of this region.

Children with respiratory allergy in the Syrdarya region and the distribution of sick children by sex and age are presented in Table No. 1.

Table 1.

Распределение больных детей по полу и возрасту, абс. число

№	Diagnosis	Number of patients	Age	Boys	Girls
1.	Bronchial asthma	21 (34,4)	7-8 years	1 (4,7)	4 (19)
			13-14 years	6 (28,5)	10 (4,7)
2.	Allergic rhinitis	40 (65,6)	7-8 years	9 (22,5)	6 (15)
			13-14 years	20 (50)	5 (12,5)
3.	Total	61		36 (59)	25 (41)

* Note: percentages (%) are given in parentheses .

An innovative test method for *in vitro* investigation of type 1 allergic reactions is the ALEX test. As is well known, this is a multiplex panel of 282 allergens (160 allergen extracts and 122 allergen molecules with the additional capability of determining sIgE), covering more than 99% of all standard diagnostic tests.

These studies will allow for the development of an individual program to eliminate contact with the causative allergen and will help save the life of a specific child.

Accurate determination of causative factors enables rational allergen vaccination. This will reduce the prevalence of allergic diseases and bronchial asthma, prevent the formation of combined forms of allergy and their progression, and improve the quality of life for children and their parents.

The analysis of the results will be presented in Tables No. 2.

Table2.

Results of the molecular profile of pollen, grass, tree, and weed allergens in children with BA and AR, %

POLLEN					
Grass pollen	**%**	**Tree pollen**	**%**	**Weed pollen**	**%**
Timothy grass *Phl p 1*	61.9	Silver wattle *Aca m*	42.8	Common lamb's quarters	52.3
Poplar	47.6	Tree of heaven *Ail a*	0	Ragweed *Amb a*	42.8
Bermuda grass	38.1	Silver birch *Bet v 1*	19.4	Mugwort *Art v*	66.6
Perennial ryegrass	28.5	Paper mulberry *Bro pa*	0	Hemp *Can s*	14.2
Paspalum/Dallis grass	33.3	Hazel *Cor a*	42.8	White goosefoot *Che a*	14.2
Common reed *Phr*	19.4	Japanese cedar *Cry j 1*	0	Annual mercury *Mer a*	19.4
Rye pollen	9.5	Cypress *Cup a 1*	14.2	Pellitory *Par j*	14.2
		Ash *Fra e*	0	Plantain *Pla*	0
		Walnut pollen *Jug r*	42.8	Saltwort *Sal k*	42.8
		Mulberry *Mor r*	0	Nettle	14.2
		Olive *Ole e 1*	0		

Respiratory allergens studied molecularly in an *in vitro* laboratory were presented: grass, tree, and weed pollen allergens. The analysis showed that when studying the grass pollen Timothy grass *Phl p1*, it was detected in nearly 62% of cases among children with BA (bronchial asthma); poplar in 48% of cases, Bermuda grass in 38.1%; Paspalum/Dallis grass – 33.3%; perennial ryegrass – 29%; Common reed *Phr* – 19.4%, and Rye pollen – in 10% of cases. As can be seen, the most frequent pollen allergens characteristic among children with BA and AR (allergic rhinitis) turned out to be Timothy grass, poplar, paspalum, and perennial ryegrass.

Next, tree pollen was studied, which showed that the most frequently detected tree pollen allergens were: Silver wattle *Aca m* detected in 43%; Hazel *Cor a_* - 43%; Walnut pollen *Jug r* – 43%. This is followed by Silver birch *Bet v 1* – 19.4% and Cypress *Cup a 1* – 14.2%.

Analysis of the results of studying the prevalence of weed pollen allergens. The analysis showed that the following allergens were detected: Mugwort *Art v* in 66.6%, Common lamb's quarters – in 52.3%, Ragweed *Amb a* – in 42.8%, Saltwort *Sal k* – in 42.8%, Annual mercury *Mer a* – in 19.4%, Hemp *Can s* – in 14.2%, White goosefoot *Che a* – in 14.2%, Pellitory *Par j* – in 14.2%, Nettle – in 14,2%.

Next, an analysis of the results of studying the prevalence of weed pollen allergens was conducted. The analysis showed that the following allergens were detected: Mugwort *Art v* in 66.6%, Common lamb's quarters – in 52.3%, Ragweed *Amb a* – in 42.8%, Saltwort *Sal k* – in 42.8%, Annual mercury *Mer a* – in 19.4%, Hemp *Can s* – in 14.2%, White goosefoot *Che a* – in 14.2%, Pellitory *Par j* – in 14.2%, Nettle – in 14.2%, Plantain *Pla* – in 0%.

Thus, the most frequent pollen allergens characteristic among children with BA and AR turned out to be Timothy grass, poplar, paspalum, perennial ryegrass, silver wattle, hazel, walnut, mugwort, common lamb's quarters, ragweed, and saltwort.

Conclusions. The study of the molecular profile of pollen sensitization revealed that 50% of children have polysensitization in various combinations. Monosensitization was detected in 10% of cases. The most common and frequent pollen allergen characteristic among children with BA and AR turned out to be Timothy grass *Phl p1* in 62%, poplar in 48%, paspalum/Dallis grass – 33.3%, and perennial ryegrass – 29%.

One of the most promising directions in allergology is the development of molecular allergology, which includes the creation of recombinant allergens for accurate diagnosis and effective allergen-specific immunotherapy (ASIT).

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