PECULIARITIES OF THE PREVALENCE OF DUST AND EPIDERMAL ETIOLOGY ALLERGY AMONG THE CHILDREN OF RURAL POPULATION IN THE CATTLE-BREEDING REGIONS

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Abstract*. The research paper presents the data from an epidemiological study of allergic diseases in children of the Farish district, Jizzakh region, Republic of Uzbekistan under the "ISAAC" – "International Study of Asthma and Allergy in Childhood". The real prevalence of allergy of dust and epidermal etiology among the children's population was closely revealed. The risk factors for its development in various age periods were determined.*

It has been established that among school children living in a cattle-breeding area, allergies of dust and epidermal etiology appear quite often – the same is true about such risk factors as hereditary burden, allergic diathesis, focal infections and artificial feeding in the first year of life.

Allergy of dust and epidermal etiology has some features of the clinical course: an excess of the specific frequency of polysensibilization, a frequent combination of several forms of allergic reactions, polymorphism and diversity of clinical symptoms, frequent damage to the gastrointestinal tract, as well as a violation of the functional activity of the central nervous system, and physical development.

In the etiology of sensitization of the body, household (house dust) and epidermal allergens (wool of sheep, goats, dogs, cats) are of decisive importance.

Keywords: *allergen, allergy, children, cattle-breeding, sensibilization, dust, prevalence.*

RELEVANCE

The high urgency of the allergy problem is explained by the steady increase in the incidence of allergic diseases in the population of the countries all over the world, including Uzbekistan; an increase in the number of cases with characterized by more severe clinical course, the great medical and social significance of allergies, and the presence of regional characteristics [2, 7].

Currently, the allergology is successfully developing in many areas. In fact, the issues of epidemiology, clinic, etiology and pathogenesis of allergic pathology in children are of great scientific and practical importance.

One of the problematic areas of the allergy issue is the study of the etiology of allergic diseases.

The cause of sensibilization of the body are allergens of non-infectious origin.

However, many questions related to the etiology of atopic allergy remain unresolved. So, for example, if the importance of pollen allergens in the etiology of pollinosis has been sufficiently established, then this cannot be said in relation to pollen and, especially, epidermal allergens.

The number of researchers tend to believe that standard commercial house dust allergens manufactured in any one country (for example, in the USA) can be used for the specific diagnosis of atopic dust allergy.

The mentioned possibility is allegedly explained by the lack of qualitative differences in house dust from different countries. However, there are convincing facts that refute this assertion. Moreover, it has been established that not only domestic dusts from different countries, but also domestic dusts from different regions of the same country differ from each other in their composition and specific qualities [8].

Moreover, one of the most important reasons for the increase in the incidence of allergic diseases in the population is urbanization.

The proportion of large cities is increasing every year. Urbanization is also growing rapidly in the CIS countries.

Thus, the case of Uzbekistan is not an exception. The need for epidemiological studies is explained by the fact that the data obtained on the basis of patients' appeals to medical institutions do not correspond to the true prevalence of allergic diseases, since many patients either do not go to medical institutions at all for various reasons, or the doctors themselves, also for various reasons, do not establish an accurate diagnosis of allergic diseases [10]. All this leads to an underestimation of the prevalence of allergies among the child population.

Thus, epidemiological research papers based on expeditionary studies provide reliable and comparable data on the prevalence of allergy symptoms.

The purpose of the study was to study the prevalence of dust and epidermal allergy in the children's population of the cattle-breeding Farish district of the Jizzakh region of the Republic of Uzbekistan.

MATERIALS AND RESEARCH METHODS

The object of this epidemiological research paper was centered about the cattle-breeding, that was the reason why the Farish district of the Jizzakh region of Uzbekistan was chosen.

Epidemiological, allergological, immunological and statistical research methods were used in the research.

The prevalence of AD symptoms was studied with the help of questionnaire screening using the adapted international ISAAC questionnaire among 1432 school-age children in two age groups - 7-8 years old (children's parents were surveyed) and 13-14 years old (children were surveyed). In accordance with WHO recommendations, the study was based on the ISAAC epidemiological method for asthma and allergy, which is currently the world standard for studying the epidemiological and clinical manifestations of asthma, allergic rhinitis, and atopic dermatitis in the pediatric population.

The authors conducted a survey of 1432 children aged 7-8 and 13-14 years. The first age group (7-8 years old) included first-graders, the second (13-14 years old) included eighth-graders.

At the second stage of the study, a clinical and allergological examination of those schoolchildren who had allergy symptoms at the first stage was carried out.

To clarify the regional features of the clinical course of allergic diseases in children, 110 selected sick children suffering from various clinical forms of allergy, including bronchial asthma, allergic rhinitis, and allergic dermatitis, were studied in detail.

To investigate the allergy diagnostics, a standard set of non-infectious allergens was used: pollen (pollen of trees - alder, birch, oak, poplar, plane trees; pollen of cereals and meadow grasses - timothy grass, cocksfoot, meadow fescue, bonfire, bluegrass, foxtail, rye, corn; pollen of compositae, haze, weeds - wormwood, ragweed, dandelion, sunflower, quinoa); household (house

dust, library dust, dermatophagoides farinae, dermatophagoides pteronyssinus and epidermal mites (cat, goat, sheep, dog hair), food (whole chicken egg, cod, pollock, cow's milk, etc.).

The research used allergens of the research institute named after I. Mechnikov, State Enterprise "Allergen" (Stavropol City), Sevac firm (Czech Republic) and Hal (Netherlands).

Along with endoscopy of ENT organs, the functional state of the nasal mucosa and cytological examination were studied.

The research of the respiratory function of the nose was carried out with a rhinopneumotachometer (a PT-2 pneumotachometer with an attached nose nozzle was used).

The external respiration function was assessed by computer spirometry using the SPIROSIFT-3000 device (Fucuda Denshi, Japan).

Vital capacity (VC), forced vital capacity (FVC), forced expiratory volume in the first second (FEV1) were assessed.

The state of bronchial patency at the level of bronchi of large, medium and small calibers was judged by the maximum volumetric expiratory flow rate (MVEFR75, MVEFR50, MVEFR25). Peak expiratory volume flow (PEF) was measured with a portable "Mini-Wright Peak Flow Meter" from Clement Clark International Ltd. (Great Britain).

The research of immunological reactivity was carried out by determining the content of subpopulations of immunocompetent cells (CD3+, CD4+, CD8+, CD20+) using monoclonal antibodies (MCA) of the LT series (Sorbent LLC, Research Institute of Immunology, FMBA).

The presence of immunoglobulins A, M and G in the blood serum was assessed by the method of radial immunodiffusion according to Mancini using monospecific antisera of the Moscow Research Institute of Epidemiology and Microbiology named after G. I. Gabrichevsky. The content of immunoglobulin E in the blood serum was studied by ELISA using the test systems of R&D production facility “Biotechnology”.

RESULTS AND DISCUSSION

In the process of analyzing the questionnaires, a history of shortness of wheezing was noted in 18.58% of schoolchildren - in 17.73% of first-graders and in 19.36% of eighth-graders.

In the process of comparing the frequency of symptoms depending on sex, a more frequent (1.9 times) their presence was found in boys than in girls in the younger age group; no gender differences were found in the older age group.

In the majority (80.37%) of schoolchildren in both groups, the symptoms of wheezing were mild and rare, recurring no more than 1-3 times a year.

However, in the older age group, according to questionnaires, frequent (more than 12 times a year) and more severe (accompanied by limited speech) episodes of difficult breathing were detected 2 times more often.

An isolated nocturnal cough that occurs in a period of relative health, in the absence of symptoms of an acute respiratory disease, was almost 2 times more common in children aged 13-14 years.

Wheezing during or after exercise is also much more common (3.5 times) were observed in children of the older age group.

The research of the prevalence of AR symptoms showed that 30.03% of children have ever experienced sneezing, runny nose or nasal congestion in the absence of a cold or acute respiratory illness, slightly more often in eighth graders (32.02%) than in first graders (27.68%). The presence

of such symptoms in the last 12 months was noted in the questionnaires in 26.10% of children - in 29.66% of eighth-graders and in 22.26% of first-graders.

In 8.17% of children, AR symptoms were combined with conjunctivitis in the form of eye itching and lacrimation, and 3.15 times more often in older children. At the same time, only 3.12% of children were registered for AR — 2.97% of first-graders and 3.26% of eighth-graders.

In the process of analyzing a block of questions aimed at identifying symptoms of AtD, a positive answer to the question of whether they ever had an itchy rash within 6 months was received in 12.67% of children - in 18.04% of 7-8 years and in 7, 68% 13-14 years old.

The presence of this symptom in the last 12 months was observed in 4.48% of schoolchildren - in 6.48% of first-graders and in 2.33% of eighth-graders.

Symptoms of AtD during the year were 2.9 times more common in children of the younger age group. The previously established diagnosis of AtD was noted in 7.48% of children.

Thus, according to the ISAAC questionnaire, symptoms of allergic diseases (BA and/or AR and/or AtD) were detected in 47.77% of children — 45.81% of first graders and 49.18% of eighth graders.

At the same time, 17.33% of schoolchildren had symptoms of several (2-3) allergic diseases. The combination of symptoms of AtD and AR was registered in 4.46% of schoolchildren (in 5.48% of children aged 7–8 years and in 3.73% of children aged 13–14 years), and AtD and BA in 4.87% (in 7, 74 and 2.80% respectively).

The prevalence of BA and AR symptoms was higher in eighth graders than in first graders, and AtD was higher in first graders.

In the process of comparing the frequency of symptoms of BA and AR obtained in our study with the data of previous studies, there was a tendency towards an increase in the frequency of AR and its combined forms.

At the second stage of the study, a clinical and allergological examination of those schoolchildren who had allergy symptoms at the first stage was carried out.

Under the authors' supervision were 110 children suffering from atopic allergic diseases, including boys - 61 (55.5%) and girls - 49 (45.5%).

Children suffered from various clinical forms of allergy, including allergic rhinitis - 41 (%), bronchial asthma - 37 (%), atopic dermatitis - 32 (%) (Table 1.).

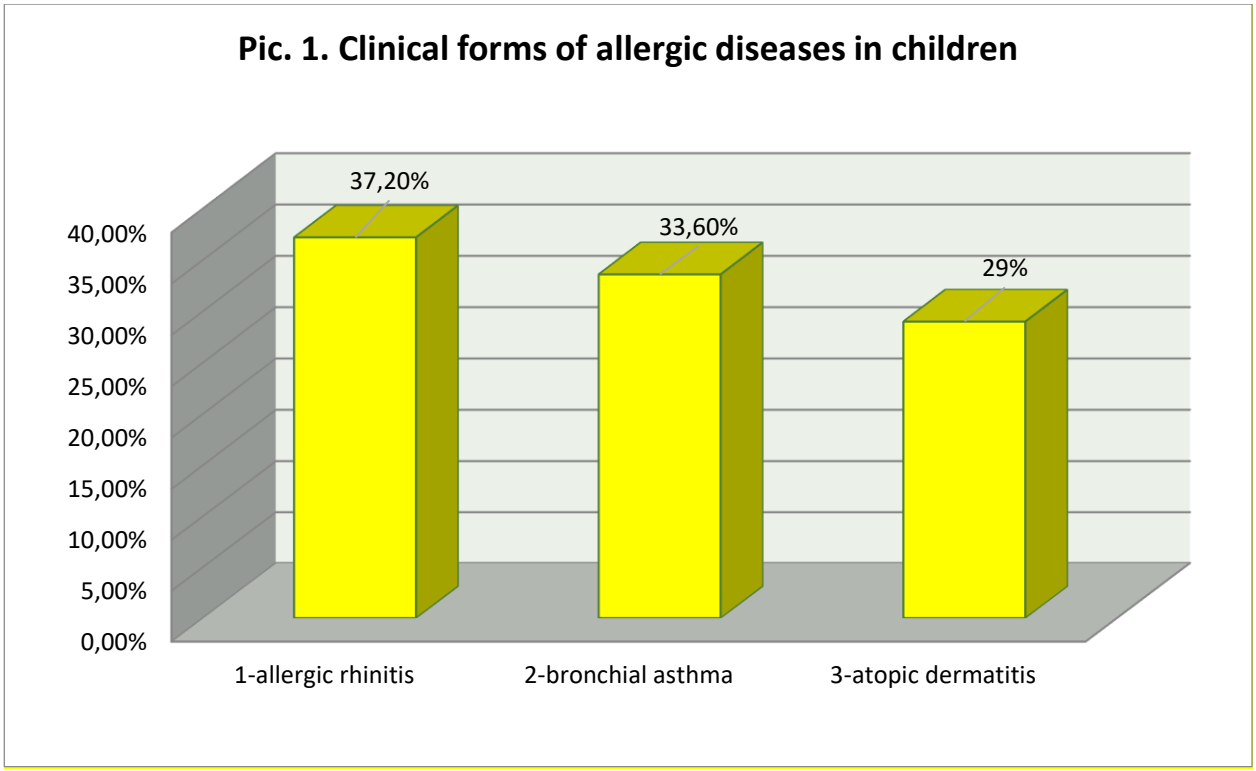
Table 1.

Clinical manifestations of allergic diseases in children*

No.	Name of diseases	Quantity
1	Allergic rhinitis	41 (37.2)
2	Bronchial asthma	37 (33.6)
3	Atopic dermatitis	32 (29)
	Total:	110 (100)

*Note: percentages (%) are given in parentheses

Children suffering from allergic rhinitis complained of tickling, burning and itching in the nose, nasopharynx, and throat. Diffuse itching in the nose and nasopharynx was the most characteristic of most sick children.



Picture 1.

Table 2.

The main symptoms characteristic of allergic rhinitis and rhinoconjunctivitis (n=28) (but according to complaints and anamnesis)

No.	Symptoms	Frequency of complaints (M±m%)
1	Diffuse itching, burning in the eyes, nose, nasopharynx and throat	24 (85.7±6.6)
2	Paroxysmal sneezing	22 (78.5±7.7)
3	Nasal congestion and difficulty in nasal breathing	17 (60.7±9D)
4	Rhinorrhea	14 (50.0±9.4)
5	General weakness, irritability and poor sleep	7 (25.0±8.1)
6	Photophobia, lacrimation	4 (14.2+6.5)
7	Fever	2 (7.1±4.8)

Another characteristic feature of the disease was paroxysmal sneezing. The patients complained of frequent sneezing, which was sometimes debilitating.

The act of breathing through the nose was difficult due to the development of edema and copious discharge of mucus from the nose.

The patients were disturbed by headaches, sleep disturbance. They were annoyed. When examining the nasal cavity, a pale bluish coloration of the nasal mucosa was observed with Voyachek's spots (vasospasm of certain sections of the nasal mucosa).

The X-raying of the maxillary sinuses revealed thickening of the mucous membrane, especially the maxillary and ethmoid labyrinth.

Nevertheless, with this form of the disease, complaints of itching, burning in the eyes and lacrimation were added.

Complaints of patients suffering from bronchial asthma depended on the period of development of the disease.

In the pre-attack period, patients were disturbed by diffuse itching in the nose, nasopharynx, cough, shortness of breath.

In the attack period, expiratory dyspnea, asthma attacks of varying severity were more clearly observed.

Asphyxiation attacks lasted from a few seconds to 1 hour or more. Attacks of suffocation arose suddenly, sometimes for no apparent reason, more often at home at night.

Some children had asthma attacks when they came into contact with pets: a cat, a dog, sheep, a goat, etc.

Pneumotachometry revealed the presence of bronchospasm. Typical asthma attacks were absent. Among the general symptoms, the phenomena of vegetodystonia prevailed.

It was revealed that out of 110 patients in 98 (89%) the underlying disease was combined with other allergic diseases: allergic dermatitis, urticaria, Quincke's edema, atopic dermatitis – 48 (48.9%), allergic diathesis – 23 (23.5%), food allergy – 12 (18.4%), drug allergy – 9 (9.2%), which is typical for atopic allergy. Along with this, in 49 (44.5%), the underlying disease was combined with other somatic diseases: pathology of the gastrointestinal tract, nervous, and cardiovascular systems.

The elucidation of the role of allergens in the etiology of allergic diseases is not only theoretical, but also of great practical importance. Clarification of the cause of sensitization is important for making a specific diagnosis, as well as determining the type of allergic reactions, that is, the pathogenesis of the underlying disease.

As the result, one of the authors' tasks was turned to elucidating the role of dust and epidermal allergens in the etiology and pathogenesis of atopic allergic diseases in children.

In order to accomplish the previously mentioned task, several in vivo and in vitro allergy tests were used. The use of several allergy tests for the same task improves the quality of the information obtained. First of all, the patients were given skin (scarification) tests with an allergen from house dust.

The frequency of sensitization of the organism of sick children to the allergen from house dust was not the same and, relatively, depended on the clinical manifestations of atopic allergy. Thus, the highest frequency of body sensitization was in children suffering from bronchial asthma (31.4 ± 7.8%). In second place were children suffering from allergic rhinitis (29.0 ± 8.1%).

Moreover, the frequency of sensitization of the body of children suffering from atopic dermatitis – (12.5 ± 8.2%) was even lower. In general, sensitization to an allergen from house dust was observed in 29 (26.4 ± 8.1%) patients with atopy. Therefore, it can be assumed that in the etiology of respiratory allergies in children, the allergen from house dust is of great importance, while in the etiology of allergic dermatitis this allergen is of less importance. The intensity of the inflammatory reactions of the skin to the action of the allergen from house dust was different.

With respiratory allergies, the intensity of the severity of inflammatory reactions of the skin in most patients was expressed as ++ and +++, while with allergic rhinoconjunctivitis, urticaria and Quincke's edema, only + and ++. In general, in the majority of patients – 18 (62.0%), the intensity of inflammatory reactions of the skin was expressed as ++ and +++. In 3 (10.3%) patients, the severity of allergic skin reactions was ++++.

The most important indicator of atopic allergic diseases is hereditary predisposition.

According to the authors' data, allergic hereditary aggravation was observed in 77 (70.0%) patients.

According to the family history, the hereditary predisposition was on the paternal side – in 11 (14.3%), on the maternal side – in 24 (31.2%), simultaneously on the part of both parents – in 42 (54.5%).

CONCLUSION

The conducted epidemiological studies have shown that atopic allergic diseases of dust and epidermal etiology are not only often found among the children's rural population of the livestock breeding district of the Jizzakh region of Uzbekistan, but also have some regional features.

The frequency of allergic morbidity in children was relatively independent of the age and sex of children and depended on the clinical forms of disease manifestations. Children suffered most from respiratory allergies.

In the development of atopic allergy in children, exogenous factors played a significant role: a history of various other diseases (35.9 ± 3.0 74.7 ± 2.7%), allergenic foods consumed by mothers during pregnancy (26.8 ± 2 .7%), toxicosis of pregnancy (68.7 ± 2.9%), artificial or previously mixed feeding of newborns (53.3 ± 4.3%), as well as endogenous factors - allergic burden (64.8 ± 3.0 %). The cause of body sensitization was various non-infectious allergens. The frequency of body sensitization depended on the clinical forms of diseases and the type of allergen.

So, in general, the frequency of sensitization to the allergen from house dust was 40.3%, to the allergen from sheep wool – 42.2%, to the allergen from goat wool – 36.7%, to the allergen from cat hair – 12.6%, for an allergen from dog hair – 8.6%.

Another clinical feature of atopic allergic diseases was revealed: the predominance of cases of polysensitization, that is, the simultaneous increase in sensitivity to several allergens.

Thus, the problem of atopic allergy is also relevant in the regional conditions of Uzbekistan. Dust and epidermal allergens play an important role in the etiology of atopic allergy in children living in rural, especially livestock areas.

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