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O.V. Shmulich

Kharkov National Medical University

COMPARATIVE ASSESSMENT OF THE SIGNIFICANCE OF DOMESTIC AEROALLERGENS IN THE ETIOLOGY OF ACUTE ALLERGOSIS, URTICARIA IN CHILDREN

By the method of prick-test we observed 333 children aged from 4 to 18 years during the period of stable remission after acute allergosis, urticaria. The findings of the study suggest Allergenum e pulvere domesticum e Dermatophagoides farinae is dominating. It is recommended to use this trigger for specific immunotherapy at recidivous urticaria.
Keywords: *acute allergosis, urticaria, children, aeroallergens.*

One of the leading causes of acute allergosis, urticaria at children is sensitizing to different domestic aeroallergens [1–3]. Most authors [4–6] noted that allergenic aggressiveness of the house dust depends primarily on the number and kinds of mites inhabiting there, which belong, generally, to allergens from house dust (Allergenum e pulvere domesticum), allergens from house dust enriched by Dermatophagoides pteronyssinus (Allergenum e pulvere domesticum e Dermatophagoides pteronyssinus), allergens from house dust enriched by Dermatophagoides farinae (Allergenum e pulvere domesticum e Dermatophagoides farinae), allergens from house dust enriched by Acarus siro (Allergenum e pulvere domesticum ex Acarus siro). Besides, domestic allergens include Allergenum e pulvere bibliothecae, Allergenum e pluma pulvini, and Allergenum e Daphnia magna.

We set the problem to make a comparative assessment of the significance of domestic aeroallergens in etiologic spectrum of acute allergosis and urticaria at children by prick-test in the period of stable remission of the disease.

Materials and Methods. The objective of the study was the comparative assessment of the significance of domestic aeroallergens in etiology of acute allergosis, urticaria at children. We observed 333 children aged from 4 to 18 with acute allergosis, urticaria. The research implemented in regional children's allergy center based in Kharkov Regional Children's Clinical Hospital № 1.

Skin testing with allergens has been a valuable method of an allergy testing [6]. The objective of tests is confirming the role of allergens in the development of the disease, which suggestive of hypersensitivity according to anamnesis. This highly sensitive method enabling to determine specific sensitization by percutaneous allergen injecting and evaluation of the magnitude and nature of the edema or inflammatory reaction. Testing can be performed using scratch test, injection test, prick test, and the intradermal test techniques. We have performed allergy prick testing.

The indications for skin testing with allergens were clinical anamnesis, the data of clinical and laboratory examinations.

Standard serial allergens containing 10,000 PNU/ml made of pollen, house dust, wool, food etc. were used for skin testing (producer LRS Immunolog, Vinnica). The principle of skin testing is based on the fact that the allergen applied to the skin interacts with Langerhans cells and macrophages. In case of sensitization, such interaction results in releasing of allergic mediators and in the development of the local allergic reaction.

Technique of the skin test with allergens. Prick testing has no age limits. Allergens, test control fluid (negative control), 0.01 % histamine

solution (positive control) are used in compliance with aseptic guidelines. Skin tests are made on the internal surface of the forearm at (30±10) mm one from another.

Single drops (0.1 ml) of a standard water-salt allergen extract for diagnosis, of the test control fluid, and 0.01 % histamine solution each are applied using a sterile PET drop-dispensing bottle on the skin disinfected with 70° ethanol alcohol. The skin is pricked through the allergen, test control fluid and 0.01 % histamine solution drops with sterile disposable prick-testing lancets all the way to the lancet stop. The lancets are individual for each patient and for each preparation.

Assessment of the skin test results. The skin test results are assessed in 15 to 20 minutes (immediate reaction). The reaction is assessed according to the pattern in table 1 below. Skin reaction to histamine should be positive, in case of negative reaction allergen test should be made. Skin reaction to test control fluid should be negative, in case of positive reaction the allergen tests should be considered [7].

Table 1. Skin test assessment pattern

Allergic reaction types	Prick testing	
	papule size, mm	legend
Negative	0	–
Slightly positive	1–2	+
Positive	3–7	++
Strong positive	8–12	+++
Hyperergic	13 and over	++++

We analyzed the test results by the degree of manifestation of skin reaction to the specific allergen to determine the most probable allergens in case of onset or exacerbation of acute allergosis, urticaria in children. The range of allergic reactions from ++ to ++++ was considered causally significant in the etiologic spectrum of the disease.

The results of the observations are in table 2. According to the table 2, the number of children suffering from acute allergosis, urticaria, prevails significantly in prepubertal and pubertal periods.

The results of research (tables 3–6) demonstrate that in emergence of an acute allergosis,

Table 2. Allocation of patients depending on sex and age

Parameter	Age, years						Total
	4–8		9–12		13–18		
	boys	girls	boys	girls	boys	girls	
abs.	n=37	n=36	n=51	n=62	n=69	n=78	333
%, $p \pm s_p$	11.1±1.7	10.8±1.7	15.3±1.9	18.6±2.1	20.7±2.2	23.4±2.3	
p	p>0.05		p>0.05		p>0.05		
abs.	n=73		n=113		n=147		
%, $p \pm s_p$	21.9±2.2		33.9±2.5		44.1±2.7		
p	$p_{(4-8)/(9-12)}>0.05$; $p_{(4-8)/(13-18)}<0.05$; $p_{(9-12)/(13-18)}>0.05$						

Table 3. Allergy reaction grade during testing of children suffering from acute allergosis, urticaria to domestic aeroallergens, absolute measures

Allergens	Allergy grade	Age, years					
		4–8		9–12		13–18	
		boys (n=37)	girls (n=36)	boys (n=51)	girls (n=62)	boys (n=69)	girls (n=78)
A.D. pteronissimus	+	2	2	2	5	7	10
	++	3	3	5	7	7	8
	+++	2	2	2	2	2	3
	++++	1	2	2	2	0	0
A.D. farina	+	13	1	7	5	19	20
	++	12	6	18	31	29	8
	+++	2	2	2	3	2	4
	++++	4	2	4	3	11	15

Table 3 continuation

Allergens	Allergy grade	Age, years					
		4–8		9–12		13–18	
		boys (n=37)	girls (n=36)	boys (n=51)	girls (n=62)	boys (n=69)	girls (n=78)
A.P. bibliothecae	+	3	3	4	6	9	10
	++	5	5	6	6	5	6
	+++	0	0	1	2	3	3
	++++	0	0	0	0	0	0
A.D. Acarus siro	+	2	2	3	5	9	10
	++	3	4	5	7	6	7
	+++	1	2	2	4	2	3
	++++	1	1	1	1	0	0
A.P. pulvini	+	2	2	3	8	6	11
	++	3	3	5	6	6	6
	+++	2	2	2	2	4	3
	++++	0	0	0	0	1	0
A. Daphnia magna	+	1	1	2	4	8	10
	++	2	2	5	7	7	8
	+++	3	2	3	3	2	2
	++++	2	2	2	2	2	1

Table 4. Allergy reaction rate during testing of children aged 4 to 8 years suffering from acute allergosis, urticaria to domestic aeroallergens, % ($p \pm s_p$)

Allergens	Allergy grade	Boys (n=37)	Girls (n=36)
A.D. pteronissimus	+	5.4±3.7	5.6±3.8
	++	8.1±4.5	8.3±4.6
	+++	5.4±3.7	5.6±3.8
	++++	2.7±2.6	5.6±3.8
A.D. farina	+	35.1±7.8	2.8±2.7
	++	32.4±7.7	16.7±6.2
	+++	5.4±3.7	5.6±3.8
	++++	10.8±5.1	5.6±3.8
A.P. bibliothecae	+	8.1±4.4	8.3±4.6
	++	13.5±5.6	13.9±5.7
	+++	0	0
	++++	0	0
A.D. Acarus siro	+	5.4±3.7	5.6±3.8
	++	8.1±4.5	11.1±5.2
	+++	2.7±2.7	5.6±3.8
	++++	2.7±2.7	2.8±2.7
A.P. pulvini	+	5.4±3.7	5.6±3.8
	++	8.1±4.5	8.3±4.6
	+++	5.4±3.7	5.6±3.8
	++++	0	0
A. Daphnia magna	+	2.7±2.7	2.8±2.7
	++	5.4±3.7	5.6±3.8
	+++	8.1±4.8	5.6±3.8
	++++	5.4±3.7	5.6±3.8

Table 5. Allergy reaction rate during testing of children aged 9 to 12 years suffering from acute allergosis, urticaria to domestic aeroallergens, % ($p \pm s_p$)

Allergens	Allergy grade	Boys (n=51)	Girls (n=62)
A.D. pteronissimus	+	3.9±2.7	8.1±3.5
	++	9.8±4.2	11.3±4.0
	+++	3.9±2.7	3.2±2.2
	++++	3.9±2.7	3.2±2.2
A.D. farina	+	13.7±4.8	8.1±3.5
	++	35.3±6.7	50.0±6.4
	+++	3.9±2.7	4.8±2.7
	++++	7.8±3.7	4.8±2.7
A.P. bibliothecae	+	7.8±3.8	9.7±3.7
	++	11.8±4.5	9.7±3.7
	+++	2.0±1.9	3.2±2.2
	++++	0	0
A.D. Acarus siro	+	5.9±3.3	8.1±3.5
	++	9.8±4.2	11.3±4.0
	+++	3.9±2.7	6.5±3.3
	++++	2.0±1.9	1.6±1.6
A.P. pulvini	+	5.9±3.3	12.9±4.3
	++	9.8±4.2	9.7±3.8
	+++	3.9±2.7	3.2±2.2
	++++	0	0
A. Daphnia magna	+	3.9±2.7	6.5±3.1
	++	9.8±4.2	11.3±4.0
	+++	5.9±3.3	4.8±2.7
	++++	3.9±2.7	3.2±2.2

Table 6. Allergy reaction rate during testing of children aged 13 to 18 year suffering from acute allergosis, urticaria to domestic aeroallergens, % ($p \pm s_p$)

Allergens	Allergy grade	Boys (n=69)	Girls (n=78)
A.D. pteronissimus	+	11.3±4.0	12.8±3.8
	++	11.3±4.0	10.3±3.4
	+++	3.2±2.2	3.8±2.2
	++++	0	0
A.D. farina	+	30.6±5.9	25.6±4.9
	++	46.8±6.3	10.3±3.4
	+++	3.2±2.2	5.1±2.4
	++++	17.7±4.8	19.2±4.5
A.P. bibliothecae	+	14.5±4.5	12.8±3.4
	++	8.1±3.5	7.7±3.0
	+++	4.8±2.7	3.8±2.2
	++++	0	0
A.D. Acarus siro	+	14.5±4.5	12.8±3.7
	++	9.7±3.7	9.0±3.2
	+++	3.2±2.2	3.8±2.2
	++++	0	0
A.P. pulvini	+	9.7±3.8	14.1±3.9
	++	9.7±3.8	7.7±3.0
	+++	6.5±3.1	3.8±2.2
	++++	1.6±1.6	0

Table 6 continuation

Allergens	Allergy grade	Boys (n=69)	Girls (n=78)
A. Daphnia magna	+	12.9±4.3	12.8±3.8
	++	11.3±4.0	10.3±3.4
	+++	3.2±2.2	2.6±1.8
	++++	3.2±2.2	1.3±1.2

urticaria at children among household allergens the dominating role is played by Allergenum e pulvere domesticum e Dermatophagoides Farinae. The prick tests with the allergen have hyperergic severity. It is characterized for children of pubertal age and boys of 9–12 years. We have not revealed the other statistically significant quantitative and qualitative differences, by results of prick tests at children of both sexes. Other above-mentioned aeroallergens show single hyperergic reaction and they are inferior to allergen Dermatophagoides Farinae in terms of quantity. It is not excluded immediate allergic reaction and after the child's contact with the allergen of Daphnia, as there is a wide range of allergic reactions to skin prick tests of the + to ++++ in all age groups, however, such reactions are not numerous.

Thus, the findings of the study suggest that Allergenum e pulvere domesticum e Dermatophagoides farina is the causally significant in emergence of an acute allergosis, urticaria among domestic aeroallergens. It is the most aggressive and can be the cause of an emergence or an exacerbation of the whole group of allergic diseases, including respiratory and dermato-allergic diseases at children. Therefore, considering the etiological common of the trigger for most of the allergic diseases is reasonable to create a vaccine containing Allergenum e Dermatophagoides farina for polyvalent specific immunotherapy (ASIT) for allergies in children.

Conclusions

1. Domestic aeroallergens have a significant role in the emergence of acute allergosis, urticaria in children.

2. Allergenum e pulvere domesticum e Dermatophagoides Farinae is made the dominating role in the etiological spectrum of the diseases.

3. The prevalence of acute allergosis, urticaria disease in puberty period of life is caused apparently by a hormonal imbalance of reproductive and adrenal glands of internal secretion.

4. Therefore, considering special aggressiveness of Allergenum e Dermatophagoides farinae among the domestic allergens and the etiological identity of the trigger in the emergence of the group of allergic diseases including respiratory and dermato-allergic diseases at children. It is reasonable to create a vaccine containing Allergenum e Dermatophagoides farina for polyvalent specific immunotherapy for allergies at children suffering from recidivous urticaria.

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О.В. Шмуліч

ПОРІВНЯЛЬНА ОЦІНКА ЗНАЧУЩОСТІ АЕРОАЛЕРГЕНІВ ОСЕЛІ В ЕТІОЛОГІЇ ГОСТРОГО АЛЕРГОЗУ, КРОПИВ'ЯНКИ У ДІТЕЙ

Методом prick-тесту обстежено 333 дитини у віці від 4 до 18 років у період стійкої ремісії після перенесеного гострого алергозу, кропив'янки. Allergenum e pulvere domesticum e Dermatophagoides farinae визнаний домінуючим в етіологічному спектрі захворювання. Рекомендовано даний тригер використовувати для специфічної імунотерапії при рецидивуючій кропив'янці.

Ключові слова: *гострий алергоз, кропив'янка, діти, аероалергени*.

О.В. Шмулич

СРАВНИТЕЛЬНАЯ ОЦЕНКА ЗНАЧИМОСТИ АЭРОАЛЛЕРГЕНОВ ЖИЛИЩА В ЭТИОЛОГИИ ОСТРОГО АЛЛЕРГОЗА, КРАПИВНИЦЫ У ДЕТЕЙ

Методом prick-теста обследовано 333 ребенка в возрасте от 4 до 18 лет в период стойкой ремиссии после перенесенного острого аллергоза, крапивницы. Allergenum e pulvere domesticum e Dermatophagoides farinae признан доминирующим в этиологическом спектре заболевания. Рекомендовано данный триггер использовать для специфической иммунотерапии при рецидивирующей крапивнице.

Ключевые слова: *острый аллергоз, крапивница, дети, аэроаллергены.*

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