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## Sensitization pattern to inhalant allergens in Armenian children

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It is important to have information about the prevalence of allergens and sensitizations present in the region the patient lives for optimal clinical care in allergy. The allergic reaction first requires sensitization to a specific allergen and occurs in genetically predisposed individuals. In case of allergen sensitization, the TH0 cells develop into TH2 cells. TH2 cells can then act on the B cell to promote class switching from immunoglobulin M production to antigen-specific IgE production [1, 8-10]. Skin-prick testing is the standard for diagnosing IgE-mediated allergies [2, 6, 7].

A European survey has been conducted to assess sensitization to the most common allergens in patients attending allergy outpatient clinics in different countries across Europe. This study is called the *Pan-European standard skin-prick test study* (PEP-study) and is realized in the frame of the European network for allergy and asthma, Global Allergy and Asthma European Network (GA2LEN). This innovative tool was initiated in July 2005 for the surveillance of changes in epidemiology in GA2LEN 25 research centers. The skin prick test panel, which assesses sensitization against 18 inhalant allergens for the first time provided standardized data on the frequency of many under-detected inhalant allergens in European patients suffering from allergic rhinitis and asthma. There would be advantages in harmonizing the standard panels of allergens used in different European countries, both for clinical purposes and for research, especially with increasing mobility within Europe and current trends in botany and agriculture. As well as improving diagnostic accuracy, this would allow better comparison of research findings in European allergy centers [4].

Currently *Allergic Sensitization and Diseases in Armenian Children study* (ASDAC-study) was performed in the frame of PEP study to assess the prevailing sensitizations to inhalant allergens in Armenia using the standardized

panel and method as in PEP study. Taking into account the local peculiarities one additional allergen of poplar was used in Armenia in addition to 18 inhalant allergens panel of PEP study. Current report will provide information about sensitization pattern of 231 children with atopy suspicion applied to Republican Allergy Centre placed in “Arabkir” Joint Medical Centre – Institute of Child and Adolescent Health (“Arabkir” JMC-ICAH).

The aim of the study was to reveal prevailing sensitizations to inhalant allergens in Armenian children presenting atopy and to implement a standardized method for diagnosis and care. This will allow to work with standards developed by GA2LEN for 25 European Centers and gave the opportunity to compare the obtained data with participant countries of PEP project [5].

### **Materials and Methods**

The investigation was approved by Institutional Bioethics Committee and conforms to the principles outlined in the Declaration of Helsinki” (Br. Med. J., 1964; p.177 ).

A pediatric allergy specialist was trained in Zurich University Children’s Hospital to learn the standardized method of skin-prick testing and to develop the tools used in ASDAC study. Special forms of patient examination have been developed including questionnaires for parents, family and personal history data, physical examination, environmental factors, prick-test results.

Intrahospital protocols were developed for physicians to choose the eligible patients for ASDAC study. A total of 231 children aged 2-18 years applied to Republican Allergy Centre with previous history or suspicion of atopic disease (atopic dermatitis, allergic rhinitis, bronchial asthma) were evaluated for sensitization to inhalant allergens using standardized prick test method, allergen solutions and panel. Data were saved and analyzed in SPSS 10.

### **Results and Discussion**

The sensitization pattern to 19 inhalant allergens is as presented in the following graphic.

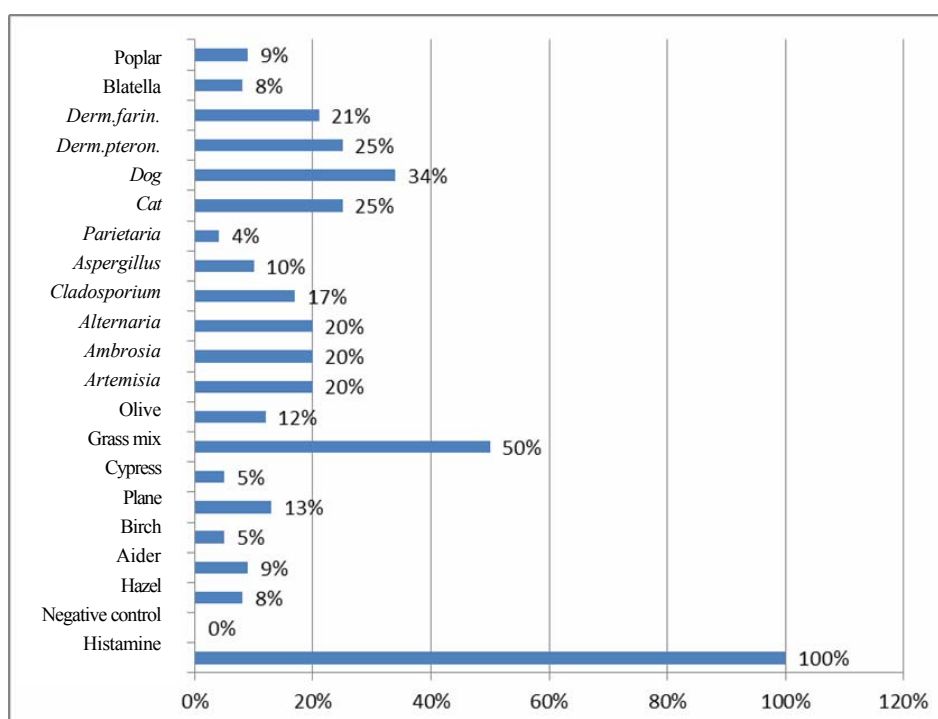
192 (83%) of all investigated children had sensitization to at least 1 allergen. 31 (13% of all) children had monosensitization, 161 (70%) had polysensitization up to maximum 12 allergens. The most prevalent allergen in Armenia, as in Europe, was the grass mix: 115 (49.8%). In comparison to European countries, where birch pollen was the 3<sup>rd</sup> important allergen, tree pollen allergens were less important for Armenia: the most prevalent one was the plane – 13.4% (31). 10 allergens allowed identification of more than 95% of sensitized subjects (grass mix, *Dermatophagoides pteronyssinus*, dog,

*Alternaria*, plane, *Artemisia*, hazel/olive (or ash), cat/ *Dermatophagoides farinae*). 12 allergens were needed to identify all sensitized children (grass mix, *Dermatophagoides pteronyssinus*, dog, *Alternaria*, plane, *Artemisia*, hazel/olive (or ash), cat/*Dermatophagoides farinae*, *Cladosporium*/poplar).

Bousquet et al. presented the prevalence of sensitization according to the country, allergens order from the most prevalent to the less under condition for each country participated in PEP study [3]. The data obtained from Armenia are added to the mentioned information and are presented (Tables 1,2).

Graphic

#### ***Sensitization rates to inhalant allergens in Armenia***



Based on the collaborative project between “Arabkir” JMC-ICAH and University Children’s Hospital Zurich 231 children from Armenia presenting atopic disease were tested by a standardized skin prick test with a standardized spectrum of 19 allergens. The obtained data were compared with the data from 14 European countries. 10 and 12 allergens out of 18 needed to identify accordingly more than 95% and 100% of sensitized children in Armenia. In Europe, depending on the country, two (Switzerland) to nine (France) allergens out of 18 were sufficient to identify 95% of sensitized subjects; while four (Switzerland) to 13 (France, Portugal) allergens were required to identify 100% of sensitized subjects.

Table 1

Prevalence of sensitization according to the country, allergens order from the most prevalent to the less under condition for each country

Country	n	1	2	3	4	5	6	7	8	9	10	11	12	13
Armenia	231	115 (49.8%)	147 (63.6%)	165 (71.4%)	173 (74.9%)	178 (77.1%)	182 (78.8%)	186 (80.5%)	190 (82.3%)	192 (83.1%)	-	-	-	-
Austria	202	56 (27.7%)	75 (37.1%)	87 (43.1%)	93 (46%)	97 (48%)	100 (49.5%)	103 (51%)	104 (51.5%)	105 (52%)	106 (52.5%)	107 (53%)	-	-
Belgium	200	59 (29.5%)	75 (37.5%)	86 (43%)	89 (44.5%)	91 (45.5%)	92 (46%)	93 (46.5%)	94 (47%)	95 (47.5%)	-	-	-	-
Denmark	178	122 (68.5%)	145 (81.5%)	160 (89.9%)	165 (92.7%)	167 (93.8%)	168 (94.4%)	169 (94.9%)	170 (95.5%)	171 (96.1%)	-	-	-	-
England	131	71 (54.2%)	93 (71%)	98 (74.8%)	99 (75.6%)	-	-	-	-	-	-	-	-	-
Finland	169	48 (28.4%)	63 (37.3%)	70 (41.4%)	75 (44.4%)	78 (46.2%)	79 (46.7%)	80 (47.3%)	81 (47.9%)	82 (48.5%)	-	-	-	-
France	200	70 (35%)	94 (47%)	102 (51%)	107 (53.5%)	110 (55%)	113 (56.5%)	116 (58%)	119 (59.5%)	121 (60.5%)	123 (61.5%)	124 (62%)	125 (62.5%)	126 (63%)
Germany	393	125 (31.8%)	178 (45.3%)	203 (51.7%)	211 (53.7%)	219 (55.7%)	227 (57.8%)	232 (59%)	234 (59.5%)	235 (59.8%)	-	-	-	-
Greece	217	107 (49.3%)	142 (65.4%)	157 (72.4%)	165 (76%)	170 (78.3%)	173 (79.7%)	175 (80.6%)	176 (81.1%)	177 (81.6%)	178 (82%)	179 (82.5%)	-	-
Hungary	259	137 (52.9%)	160 (61.8%)	166 (64.1%)	175 (67.6%)	178 (68.7%)	181 (69.9%)	183 (70.7%)	184 (71%)	185 (71.4%)	186 (71.8%)	187 (72.2%)	-	-
Italy	230	86 (37.4%)	126 (54.8%)	133 (57.8%)	138 (60%)	141 (61.3%)	143 (62.2%)	144 (62.6%)	145 (63%)	146 (63.5%)	147 (63.9)	-	-	-
Poland	199	83 (41.7%)	108 (54.3%)	122 (61.3%)	131 (65.8%)	136 (68.3%)	138 (69.3%)	140 (70.4%)	141 (70.9%)	142 (71.4%)	-	-	-	-
Portugal	169	113 (66.9%)	136 (80.5%)	148 (87.6%)	153 (90.5%)	157 (92.9%)	159 (94.1%)	161 (95.3%)	162 (96.4%)	163 (96.4%)	164 (97%)	165 (97.6%)	166 (98.2%)	167 (98.8%)
Switzerland	116	93 (80.2%)	100 (86.2%)	103 (88.8%)	104 (89.7%)	-	-	-	-	-	-	-	-	-
The Netherlands	265	92 (34.7%)	122 (46%)	131 (49.4%)	137 (51.7%)	142 (53.6%)	145 (54.7%)	148 (55.8%)	150 (56.6%)	151 (57%)	-	-	-	-

1: Grass, 2: Dermatophagoides pteronyssinus, 3: Birch pollen, 4: Cat dander, 5: Artemisia, 6: Olive pollen, 7: Blatella, 8: Alternaria, 9: Dog dander, 10: Parietaria, 11: Ambrosia, 12: Dermatophagoides farinae, 13: Cypress pollen, 14: Aspergillus, 15: Alder, 16: Plane pollen, 17: Cladosporium, 18: Hazel.

Results are expressed in frequencies and percents.

Cells in gray: more than 95% of sensitized subjects are identified.

Empty cells: additional allergen did not change the prevalence.

Table 2  
Allergens tested are reported in the table thereafter

Country	1	2	3	4	5	6	7	8	9	10	11	12	13
Armenia	gra	derp	dog	alt	pla	art	haz/oli	cat/derf	Clal/pop*	-	-	-	-
Austria	gra	derp	bir	cat	art	dog	oli	cyp/pla	bla	alt	derf	-	-
Belgium	derp	gra	bir	dog	cyp	bla	art	derf	asp	-	-	-	-
Denmark	gra	derp	bir	art	dog/cat	dog/cat	derf	pla	bla	-	-	-	-
England	gra	derp	cat	bir/ald/pla	-	-	-	-	-	-	-	-	-
Finland	dog	bir	bla	derp	cat	asp/cia	gra	alt	art	-	-	-	-
France	derp	gra	oli	cat	bla	cyp	dog	ald	asp/art	asp/art	alt	derf	amb
Germany	bir	derp	gra	cat	bla	alt	art	dog	asp	ald/pla	cla	-	-
Greece	gra	derp	oli	alt	par	cat/dog	amb	asp	bla	art	derf	ald	-
Hungary	amb	cat	gra	derp	art	alt	oli	cyp	cla	dog	derf	-	-
Italy	derp	par	oli	cat	gra	dog	bir/ald/haz	art/amb	cyp	pla	-	-	-
Poland	gra	derp	bir	dog	cat	alt	art	cyp	asp	-	-	-	-
Portugal	derp	gra	par	dog	derf	bir	bla	art	asp	cat	ald	haz	alt
Switzerland	gra	cat	derf	bir/ald/haz	-	-	-	-	-	-	-	-	-
The Netherlands	gra	derp	bir	oli	bla	amb	cat	derf	asp/par	-	-	-	-

1: Grass, 2: *Dermatophagoides pteronyssinus*, 3: Birch pollen, 4: Cat dander, 5: *Artemisia*, 6: Olive pollen, 7: *Blatella*, 8: *Alternaria*, 9: Dog dander, 10: *Parietaria*, 11: *Ambrosia*, 12: *Dermatophagoides farinae*, 13: Cypress pollen, 14: Aspergillus, 15: Alder, 16: Plane pollen, 17: *Cladosporium*, 18: Hazel, 19: poplar\* only for Armenia  
 ald: Alder, alt: *Alternaria*, amb: *Ambrosia*, art: *Artemisia*, asp: *Aspergillus*, bir: Birch pollen, bla: *Blatella*, cat: Cat dander, cla: *Cladosporium*, cyp: Cypress pollen, derf: *Dermatophagoides farinae*, derp: *Dermatophagoides pteronyssinus*, dog: Dog dander, gra: Grass pollen, haz: Hazel, oli: Olive pollen, par: *Parietaria*, pla: Plane pollen.  
 Cumulative frequency and percent are reported.  
 Cells with more than one allergen: The impact of all these allergens is similar. Each of them can substitute the others.

The most prevalent allergen in Armenia was grass mix as in the majority of European countries. The impact of *Dermatophagoides farinae* on sensitization pattern was lower than expected in Armenia, as well as in other countries. This was probably the consequence of the cross reactivity with *Dermatophagoides pteronyssinus*. The latter one was more prevalent, and many patients were sensitized to both of them.

Unexpectedly, an important level of olive sensitization was revealed in Armenia, taking into account the fact that only few olive trees grow in restricted parts of present area of Armenia. These results may be due to testing of subjects who have migrated from other countries or by crossreactivity between olive and ash.

Thus, a limited number of allergens allowed the identification of the majority of sensitized subjects. However, 10 allergens are not sufficient to provide comprehensive diagnostic information for individual patients. Thus, for clinical practice, the whole battery of 19 allergens is needed to assess appropriately the allergens affecting at least 1–2% of patients [3]. The most important inhalant allergen in Armenia was grass pollen. Tree pollen allergens were less important for Armenia compared to Europe.

#### **Acknowledgments**

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### **Ինհալացիոն ալերգենների նկատմամբ սենսիբիլիզացիայի պատկերը Հայաստանի երեխաների շրջանում**

**Ա.Ա. Բադրասարյան, Ա.Ա. Սարգսյան**

Իրականացվել է *Ալերգիկ սենսիբիլիզացիան և հիվանդությունները երեխաների շրջանում Հայաստանում* հետազոտությունը՝ գնահատելու համար ինհալացիոն ալերգենների նկատմամբ գերակշռող սենսիբիլիզացիան Հայաստանում՝ օգտագործելով ՀԵՊ հետազոտության (Համաեվրոպական պրիկ-թեստ) ստանդարտ ալերգեն լուծույթներն ու մեթոդը: Հետազոտության նպատակն էր բացահայտել գերակշռող սենսիբիլիզացիան ատոպիա ունեցող երեխաների շրջանում Հայաստանում և ներդնել ստանդարտացված ախտորոշիչ մեթոդ:

2-18 տարեկան 231 երեխաների շրջանում, ովքեր դիմել են «Արաբկիր» ԲՀ ատոպիայի կասկածով, իրականացվել է մաշկային պրիկ-թեստ ինհալացիոն ալերգենների նկատմամբ՝ օգտագործելով

ստանդարտացված մեթոդը, ալերգեն լուծույթները և ցանկը: Տվյալները վերլուծվել են SPSS 10-ով:

Հետազոտվածներից է 192 (83%)-ը սենսիբիլիզացված են եղել առնվազն 1 ալերգենի նկատմամբ: 31 (13%) երեխա ունեցել է մոնոսենսիբիլիզացիա, 161 (70%)-ը՝ պոլիսենսիբիլիզացիա առավելագույնը 12 ալերգենի նկատմամբ: Հայաստանում ամենատարածված ալերգենը, ինչպես Եվրոպայում, եղել է խոտերի խառնուրդը՝ 115 (49.8%): Ի տարբերություն Եվրոպայի, որտեղ կեչին եղել է երրորդ կարևոր ալերգենը, ծառերի ալերգեններն ավելի քիչ նշանակություն են ունեցել Հայաստանի համար: Ծառերի նկատմամբ ամենատարածված սենսիբիլիզացիան դիտվել է սոսու նկատմամբ 31 (13.4%)՝ 10 ալերգենի օգնությամբ հաջողվել է բացահայտել սենսիբիլիզացվածների ավելի քան 95%-ին: 12 ալերգենը բավարար է եղել հայտնաբերելու համար բոլոր սենսիբիլիզացվածներին: Ծառերի ալերգեններն ավելի քիչ կարևորություն են ունեցել Հայաստանի համար՝ համեմատած եվրոպական երկրների հետ:

### **Спектр сенсibilизации к ингаляционным аллергенам у детей в Армении**

**А.А. Багдасарян, А.А. Саркисян**

Предпринято исследование “Аллергическая сенсibilизация и заболевания у детей в Армении” (ASDAC-study) с использованием Паневропейского стандартного прик-тест исследования (PEP-study) для выявления аллергенов, к которым наиболее часто отмечается сенсibilизация у детей с атопией в Армении, и применения стандартизированного подхода диагностики и лечения.

Обследован 231 ребенок в возрасте от 2 до 18 лет, обратившихся в МК “Арабкир” с отягощенным аллергологическим анамнезом или подозрением на наличие атопии. Проведена оценка сенсibilизации к 19 ингаляционным аллергенам с использованием стандартизированного прик-теста, растворов аллергенов и панели. Данные были сохранены и обработаны в SPSS 10.

192 (83%) ребенка имеют сенситизацию хотя бы к одному аллергену, из них 31 (13%) имеют моносенситизацию, 161 (70%) – полисенситизацию максимум к 12 аллергенам. Наиболее распространенным аллергеном в Армении, как и в Европе, была смесь трав (у 115, 49.8%). По сравнению с Европейскими странами, где сенсibilизация к пыльце березы занимает третье место, в Армении пыльца деревьев имеет меньшую актуальность. Так, сенсibilизация к платану отмечалась лишь у 31 ребенка (13.4%). Исследование 10 аллергенов позволило выявить более

чем 95% сенсibilизированных. Для выявления всех сенсibilизированных детей понадобились 12 аллергенов. Сенсibilизация к пыльце деревьев в Армении встречается значительно реже, чем в Европе.

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