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Allergologia et immunopathologia

INTERNACIONAL JOURNAL FOR CLINICAL AND INVESTIGATE ALLERGOLOGY AND CLINICAL IMMUNOLOGY
 ORGANIO OFICIAL DE LA SOCIEDAD ESPAÑOLA DE INMUNOLOGIA CLINICA Y ALERGOLOGIA PEDIATRICA

Miércoles 1 Marzo 2000. Volumen 28 - Número 2 p. 63 - 66

Original articles

The type of sensitization to pollens in allergic patients in Eskisehir (Anatolia), Turkey

E. Harmanci and M. Metintas

La alergia a polen se relaciona en parte con diferencias regionales. Estudiamos la incidencia de sensibilidad a polen en pacientes con rinitis atópica y/o asma de la región de Eskisehir en el centro de Turquía (Anatolia), donde el clima (veranos calurosos y secos, inviernos fríos) favorece la existencia de pólenes de tipo Poaceae. Realizamos pruebas cutáneas en 125 pacientes con síntomas de rinitis y/o asma utilizando extractos de Dermatophagoides, gramíneas, maleza, cereales y árboles. Se encontró sensibilidad a Dermatophagoides, un alergeno característico de interiores, de 50,4% (n = 63 pacientes). En pacientes sensibles al polen (n = 100), la sensibilidad a los Poaceae fue la más común (69%), con 45% de sensibilidad a Anthosantheum odoratum. La sensibilidad a Artemisa vulgaris fue 24%. Entre los árboles, la familia Oleacea, una especie característica de la región mediterránea, fue el alergeno más frecuente (22%) en pacientes sensibles al polen. Otro hallazgo del estudio fue una sensibilidad a los pólenes de gramíneas similar en pacientes urbanos y rurales (72,2% frente a 71,4%; p > 0,05), pero una mayor sensibilidad a pólenes de maleza y de árboles en los pacientes de zonas rurales que en urbanos (60,7% frente a 45,8% para maleza y 42,9% frente a 26,4% para árboles; p < 0,05). Los resultados sugieren que la sensibilización a polen en las atopias respiratorias puede relacionarse con diferencias en las características macroambientales (por ej. clima) y microambientales (zona urbana o rural) de una zona.

Palabras clave: Asma. Rinitis. Alergia. Pólenes. Medio ambiente. Poaceae. Familia Oleacea.

The type of sensitization to pollens in allergic patients in Eskisehir (Anatolia), Turkey

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The type of pollen allergy is in partly related to regional differences. We examined the incidence of sensitivity to pollens in patients with allergic rhinitis and/or asthma living in Eskisehir region which is located at the central part of Turkey (Anatolia) in where climates (hot-dry summers, cold-winters) facilitate alergenetic pollens such as Poaceae. We skin tested 125 patients which were complaining from rhinitis and/or asthma symptoms with using the extracts of Dermatophagoides, grass, weed, cereal and tree pollens. The reactivity to Dermatophagoides as an indoor allergen was 50.4% (n = 63 patients). In pollen allergic patients (n = 100) sensitivity to Poaceae was the most common (69%), among them positivity to Anthoxanthum odoratum was 45%. In weeds Artemisia vulgaris sensitivity was 24%. Among trees Oleacea family which is characteristic species for Mediterranean are had the highest sensitivity (22%) in pollen allergic patients. Another point of study is that whereas sensitivity to grass pollen almost equal between patients from city center and from rural area (72.2% versus 71.4%, $p > 0.05$); the patients living rural area had more sensitive to weed and tree pollens than those from city center (60.7% versus 45.8% for weeds and 42.9% versus 26.4% for trees, $p < 0.05$). The results suggested that sensitization to pollens in respiratory system allergies might be related to differences in macro (ie: climate) and micro (city or rural area) environmental characteristics of an area.

Keywords: Asthma. Rhinitis. Allergy. Pollens. Environment. Poaceae. Oleacea family.

The type of sensitization to pollens in allergic patients in Eskisehir (Anatolia), Turkey

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SUMMARY

The type of pollen allergy is in partly related to regional differences. We examined the incidence of sensitivity to pollens in patients with allergic rhinitis and/or asthma living in Eskisehir region which is located at the central part of Turkey (Anatolia) in where climates (hot-dry summers, cold-winters) facilitate alergenetic pollens such as Poaceae.

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Key words: Asthma. Rhinitis. Allergy. Pollens. Environment. Poaceae. Oleacea family.

RESUMEN

La alergia a polen se relaciona en parte con diferencias regionales. Estudiamos la incidencia de sensibilidad a polen en pacientes con rinitis atópica y/o asma de la región de Eskisehir en el centro de Turquía (Anatolia), donde el clima (veranos calurosos y secos, inviernos fríos) favorece la existencia de pólenes de tipo Poaceae.

Realizamos pruebas cutáneas en 125 pacientes con síntomas de rinitis y/o asma utilizando extractos de Dermatophagoides, gramíneas, maleza, cereales y árboles. Se encontró sensibilidad a Dermatophagoides, un alergen característico de interiores, de 50,4% (n = 63 pacientes). En pacientes sensibles al polen (n = 100), la sensibilidad a los Poaceae fue la más común (69%), con 45% de sensibilidad a *Anthoxanthum odoratum*. La sensibilidad a *Artemisia vulgaris* fue 24%. Entre los árboles, la familia Oleacea, una especie característica de la región mediterránea, fue el alergen más frecuente (22%) en pacientes sensibles al polen. Otro hallazgo del estudio fue una sensibilidad a los pólenes de gramíneas similar en pacientes urbanos y rurales (72,2% frente a 71,4%; $p > 0,05$), pero una mayor sensibilidad a pólenes de maleza y de árboles en los pacientes de zonas rurales que en urbanos (60,7% frente a 45,8% para maleza y 42,9% frente a 26,4% para árboles; $p < 0,05$). Los resultados sugieren que la sensibilización a polen en las atopias respiratorias puede relacionarse con diferencias en las características macroambientales (por ej. clima) y microambientales (zona urbana o rural) de una zona.

Palabras clave: Asma. Rinitis. Alergia. Pólenes. Medio ambiente. Poaceae. Familia Oleacea.

INTRODUCTION

Pollens of grasses is said to be a potential allergens and is responsible from airway diseases in a large parte of the world's population (1). Prevalence of allergic reactions caused by pollen is also increasing (2, 3). Allergy to individual pollens varies with regional differences (4). For example, whereas Betulaceae is a major cause of pollinosis in norther Europe, pollens suchs as Parietaria or Olea are common

types in Mediterranean are (4-6). Eskisehir is a city located in the central part of Turkey (Anatolia) and has about 500 meters of altitude in which typical climate (hot-dry summers, cold-snowy winters) favors the production of pollen types belongs to Poaceae family (such as *Anthoxanthum odoratum*, *Lolium perenne* and *Dactylis glomerata*). Due to the characteristics of climate and soil, agriculture of cereals (such as *Avena sativa*, *Triticum vulgare*, *Secale cereale*, *Hordeum vulgare*) is done extensively in our Anatolian area. We aimed in this study to assess the relevance of sensitivity to pollens and to individual pollens in patients with asthma and/or rhinitis which come from urban and rural area Eskisehir (Anatolia), Turkey.

MATERIAL AND METHODS

The study used 125 adult patients from Eskisehir and rural area around it. Eskisehir is an Anatolian city has about 500,000 population of inhabitants. The patients our outpatient department were included in the study which were born in Eskisehir region or living in this area for at least 10 years. The patients divided into two groups according to coming from city center or from urban area. Patients were diagnosed as asthma and/or rhinitis according to the consensus reports (7, 8). The mean age of the patients was 36.8 ± 6.5 (range, 15-53).

Skin tests were performed by the same physician on the volar side of the forearm pricking through a drop of extract which was immediately removed using standardized solutions (Laboratoire Des Stallergenes, France) and disposable sterile polymethacrylate micropuncture point (Stallerpoint, Laboratoire Des Stallergenes, France). The following allergens were used: *Dermatophagoides pteronyssinus* (Der p), *Dermatophagoides farinea* (Der f), grass pollens (*Dactylis glomerata*, *Anthoxanthum odoratum*, *Lolium perenne*, *Phleum pratense*, *Poa pratensis*), Cereal pollens (*Avena sativa*, *Triticum vulgare*, *Hordeum vulgare*, *Zea mays*, *Secale cereale*), weed pollens (*Artemisia vulgaris*, *Chenopodium album*, *Rumex acetosa*, *Parietaria officinalis* and *plantago*) and tree pollens (*Alnus glutinosa*, *Quercus rubor*, *Corylus avellana*, *Fraxinus excelsior*, *Populus alba*, *Salix caprea*, *Olea europea*, *Juglans regia* and *Ulmus campestris*). Histamine phosphate was used as a positive control and serum physiologic as negative control. Reactions were read at 15 minutes and a wheal size ≥ 3 mm was considered as positive.

We used Chi-square test for statistical analysis with SPSS.WIN computer program. A p value less than 0.05 was considered as significant.

RESULTS

Of the 125 allergic patients with asthma and/or rhinitis, 100 were allergic to at least one of the pollens. 25 patients were found to be sensitive only to house dust mites. When all the patients were considered, sensitivity to house dust mites was determined in 63 patients (50.4%) and sensitivity to pollens was found in 100 patients (80%).

The percentages of sensitivity to pollens are in table I. Poaceae family was by far the most common cause in pollen allergic patients (69%). *Anthoxanthum odoratum* was the most common single allergen in all pollen allergic patients.

Table I Sensitization to individual pollens in pollen allergic patients (n = 100 patients)

Grasses		Cereals		Trees		Weeds	
Subtype	%	Subtype	%	Subtype	%	Subtype	%
A. Odorum	45	Avena sativa	42	A. glutinosa	10	A. vulgaris	24
D. glomerata	37	T. vulgare	33	Q. rubor	6	C. album	18
L. Perenne	39	Zea mays	28	C. avellana	2	R. acetosa	19
P. pratense	33	Secale cereale	37	F. excelsior	19	P. officinalis	9
P. pratensis	27	H. vulgare	33	P. alba	10	Plantago	12
				S. caprea	10		
				O. europea	7		
				J. regia	11		
				U. compestris	6		
Total	69		56		31		42

Pollens of cereals which had the sensitivity of 56% and among them Avena sativa has the sensitivity of 42% in pollen allergic group. Among pollens of trees Olea has the highest sensitivity (Fraxinus excelsior and Olea Europa, 22%). Of them, Fraxinus has the most prevalent tree pollen with 19% sensitivity whereas Olea Europa has a sensitivity of 7%. Among weeds which has a sensitivity of 42%, Artemisia vulgaris has the highest sensitivity (24%) in pollen allergic patients.

Pollen allergic patients were separated according to coming from rural or urban places. 72 patients were from urban and 28 were from rural area. Among the patients from urban area, 52 patients (72.2%) had a sensitivity to grass pollens, 33 (45.8%) had a sensitivity to weed and 19 (26.4%) had a sensitivity to tree pollens. However, 20 (71.4%) of 28 patients from rural area had a sensitivity to grass pollens, 17 (60.7%) had a sensitivity to weed pollens and 12 (42.9%) had a sensitivity to tree pollens. The patients coming from rural area had been more sensitivity to weeds (60.7% versus 45.8%, $\chi^2 = 4.45$; $p < 0.05$) and to trees pollens (42.9% versus 26.4%, $\chi^2 = 6.01$; $p < 0.05$) than those coming from urban area. The prevalence of sensitivity to grass pollens were observed equally between the patients from rural and urban area (71.4% versus 72.2%, $\chi^2 = 0$; $p > 0.05$). When only subjects coming from rural area were examined, sensitization to grass pollens had been found more frequent than the sensitization to weeds ($\chi^2 = 0.72$; $p < 0.05$) and than the sensitization to tree pollens ($\chi^2 = 4.7$; $p < 0.05$). The frequency of sensitization to weed and tree pollens were found equal in the patients from rural area ($\chi^2 = 1.8$; $p > 0.05$). Again grass pollen sensitivity were more frequent in the patients from urban area, when compared with the sensitivity to weed pollens ($\chi^2 = 10.3$; $p < 0.01$) and to tree pollens ($\chi^2 = 30.2$; $p = 0.00$). Tree pollen sensitivity in the urban patients were also less frequent than the weed pollen sensitivity ($\chi^2 = 5.9$; $p < 0.05$).

DISCUSSION

We found in this study that, Poaceae family is the most common aeroallergen in pollen allergic patients with asthma and/or rhinitis in our Anatolian region. Grass pollens and cereal pollens had almost equal sensitivity in Poaceae group (57% and 56% respectively). Among the *Anthoxanthum odoratum* was the most common single allergen overall. Grass is probably the most common plant on earth and grass pollen allergy common in many parts of the world (9). But regional, geographical, climatic and soil differences effect the diversity of individual grasses found in a certain area. And it has been shown that populations living in areas heavily exposed to some pollens develop high rate of skin sensitization to these pollens. For example, D'Amato and Lobefalo demonstrated that skin sensitization to different pollens is changing from area to another area in Mediterranean region (6). It has also been reported that prevalence of sensitization to pollens are changing from area to another area in France (10). As cereals are the most extensive farming product in our region due to the climatic and soil conditions our data is consistent with the consideration of relationship between allergic sensitization and environment. Our data is quite different from the others in Turkey (5, 11). Although Turkey is considered to be a Mediterranean country, Eskisehir is in central part of the Turkey (Anatolia) and it has not a typical Mediterranean Terzioğlu et al (5) reported a high sensitization to *Parietaria* pollen (52%) in Aegean region of Turkey which has typical Mediterranean climate, whereas our patients has sensitivity of 9% to *Parietaria*. In weed pollens we found that the highest sensitivity belongs to *Artemisia vulgaris* as an individual pollen. We found *Olaecea* family (*Fraxinus excelsior* 19% and *Olea Europa* 7%) is most common tree pollen allergen in pollen allergic patients. *Fraxinus* have been reported as a common tree in Eskisehir center (12). However *Olea Europa* is found only a limited area in Eskisehir in contrast to Mediterranean coasts of Turkey in where olive pollen was reported to be an important allergen (11). But it should be consider that cross-reactivities among these tree pollens can affect our results also.

Another point of our study is that the patients from city center were less sensitivity to weed pollens and to tree pollens than the patients from urban area, whereas sensitization to grasses was the most frequent than the others in each group but it was not different between the patients from rural and urban area. That result can be explained by the effect of exposure with different pollens in the patients from different areas. It is occurred partly because of the characteristics of pollens. Trees and weeds are found more frequently in rural areas. And trees pollens are not dispersing so much distances in contrast to grass pollens. It is because the tree pollens effect mostly the people living in rural area. Changes in cultural factors, for example importation of highly allergenic grasses for urban parklands are also effecting the type of sensitization. That high prevalence of grass pollen sensitivity in our patients can be explained by above fact.

As a result we concluded that, in our Anatolian area sensitivity to Poaceae is commonest type of sensitivity in pollen allergenic patients which is thought to be resulted from climatic, geographical and cultivation differences and the patient from rural area had a higher sensitivity to Poaceae than those from rural area. In addition sensitization to tree pollens is more common in rural area. These results supported the relationship between allergenic exposure and the type of skin sensitivity to pollens in a certain area.

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