

# Retrospective evaluation of epidermal skin prick tests in patients living in Aegean region

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## ABSTRACT

Sensitization to aeroallergens of Aegean region is not well documented. In this study we evaluated the epidermal skin prick test results of the patients who applied to allergy outpatient department retrospectively.

Epidermal skin prick test of the 5055 patients were evaluated. Of these patients 2638 (52 %) were female, 2417 (48 %) male, 1213 (24 %) adult and 3842 (76 %) pediatric patient, 1163 (23 %) patients were allergic rhinitis, 2477 (49 %) were bronchial asthma, 505 (10 %) were allergic rhinitis with bronchial asthma, 556 (11 %) were chronic urticaria, 253 (5 %) were wheezy infant and 101 (2 %) patients were atopic dermatitis, 2932 (58 %) had atopy history in their first and second degree relatives. Patients were aged between 3.5 months and 79 years (mean  $14.1 \pm 3.2$  years and median 11 years). In epidermal skin prick tests sensitization to house dust mites (*D. farinae*, *D. pteronyssinus*), pollens (grass, cereals and trees), moulds, animal danders, foods (especially in early childhood) and cockroach were evaluated.

Our data indicate that allergens that may be the cause of the high prevalence of allergic diseases in İzmir are probably produced by pollens and mites.

**Key words:** Epidermal skin prick test. Atopy. Allergic diseases. Aeroallergens.

## RESUMEN

La sensibilización a los aeroalergenos en la región del Egeo no está bien documentada. En este estudio evaluamos de manera retrospectiva los resultados de las pruebas cutáneas (*prick test*) de los pacientes que acudieron al departamento de alergia del ambulatorio.

Se examinaron las pruebas cutáneas de 5.055 pacientes. De estos pacientes, 2.638 (52 %) eran mujeres, 2.417 (48 %) varones, 1.213 (24 %) adultos y 3.842 (76 %) niños; 1.163 (23 %) pacientes presentaban rinitis alérgica, 2.477 (49 %) asma bronquial, 505 (10 %) rinitis alérgica con asma bronquial y 556 (11 %) urticaria crónica; 253 (5 %) eran lactantes con sibilancias y 101 (2 %) pacientes con dermatitis atópica; y 2.932 (58 %) tenían antecedentes de atopia en sus parientes de primer y segundo grado. Los pacientes tenían entre 3,5 meses y 79 años de edad (media  $14,1 \pm 3,2$  años y mediana 11 años). En las pruebas cutáneas se evaluó la sensibilización a los ácaros del polvo doméstico (*D. farinae*, *D. pteronyssinus*), pólenes (gramíneas, cereales y árboles), mohos, caspas de animales, alimentos (especialmente en la primera infancia) y cucarachas.

Nuestros datos indican que los alérgenos que pueden ser la causa de la gran prevalencia de enfermedades alérgicas en İzmir están probablemente producidos por pólenes y ácaros.

**Palabras clave:** Prueba de punción cutánea epidérmica. Atopia. Enfermedades alérgicas. Aeroalergenos.

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## INTRODUCTION

Allergic diseases are still one of the most investigated disease groups in the world. Although our knowledges about pathogenesis, risk factors and treatment strategies, the increase of prevalence of the allergic diseases could not be prevented<sup>1</sup>. The term allergen denotes a protein or glycoprotein that can induce a specific IgE response and react with the resulting antibody molecules<sup>2</sup>. As the evidence of regional variation in the prevalence asthma and allergic diseases, the role of the environment in disease pathogenesis becomes more obvious. Although an increasing number of genetic markers linked to various phenotypic expressions of atopy have been discovered in recent years, genetic factors alone can not explain the marked difference in the prevalence of atopy. The environment was thought to be important in determining disease manifestations<sup>3</sup>.

An increasing prevalence of asthma and allergic diseases is reported from various parts of the world<sup>4,5</sup>. Rhinoconjunctivitis is also a major cause of morbidity. The prevalence of rhinitis is reported to be 44 % among children in Singapore<sup>6</sup>. Airborne pollen and spore allergens have been implicated as one of the main cause of allergic respiratory problems in temperate countries<sup>7</sup>. The variation in the prevalence of asthma, allergic rhinoconjunctivitis and atopic dermatitis symptoms is striking between different centers throughout of the world.

It is generally agreed that atopy is an important risk factor for allergic diseases such as asthma, rhinitis, and eczema, the extent to which atopy accounts for these diseases is controversial. Atopy is defined as the genetic propensity to develop immunoglobulin E antibodies in response to exposure to allergens and assessed by skin prick test responses to common allergens<sup>2</sup>.

We aim to describe the prevalence of sensitisation to common allergens and investigate the degree of association of atopy to asthma, rhinitis, eczema and chronic urticaria.

## MATERIAL AND METHODS

Study group was selected from all pediatric and adult patients referred because of cough, wheezing, shortness of breath, sneeze, block nose, itching, conjunctival hyperemia and pruritic skin lesions with the suspicion of allergic diseases to our outpatient Department of Allergy at 9 Eylül University Hospital between October 1994 and July 2001. Epidermal skin prick tests of the 5055 patients were evaluated retrospectively. In epidermal skin prick tests sensi-

zation to house dust mites (*D. farinae*, *D. pteronyssinus*), pollens (mixture of grass, cereals and trees), moulds (mixture of *Alternaria*, *Botrytis*, *Cladosporium*, *Curvularia*, *Fusarium*, *Helminthosporium*, *Aspergillus*, *Mucor*, *Penicillium*, *Pullularia*, *Rhizopus*, *Serpula*), animal danders (comprising dog, cat, rabbit and guinea pig), foods (especially in early childhood) were evaluated. Glycerol buffer and histamine were included as negative and positive controls, respectively. Allergens and positive-negative controls were applied to volar surface of arm epidermally with Allergopharma prick test solutions. Skin reactions were evaluated between zero to four degrees according to the diameter of edema and erythema with the comparement of positive and negative control reactions after 15-20 minutes with the method of Aas and Belin.

## RESULTS

Epidermal skin prick tests of the 5055 patients were evaluated retrospectively. Of these patients 2638 (52 %) were female and 2417 (48 %) male, 1213 (24 %) adult and 3842 (76 %) pediatric patient. Epidermal skin prick test results were evaluated as negative in 2637 (52 %) patients. Patients were aged between 3,5 months and 79 years (mean  $14,1 \pm 3,2$  years and median 11 years). 1163 (23 %) patients were allergic rhinitis, 2477 (49 %) were bronchial asthma, 505 (10 %) were allergic rhinitis with bronchial asthma, 556 (11 %) were chronic urticaria, 253 (5 %) were wheezy infant and 101 (2 %) patients were atopic dermatitis. 2932 (58 %) had atopy history in their first and second degree relatives.

In this study 37 % of the patients were allergic to *D. farinae*, 42 % to *D. pteronyssinus*. Grass pollen sensitivity (*Holcus lanatus*, *Dactylis glomerata*, *Lolium perenne*, *Phleum pratense*, *Poa pratensis*, *Festuca pratensis*) was found at a rate of 54 %, cereal pollen sensitivity (*Hordeum vulgare*, *Avena sativa*, *Secale cereale*, *Triticum sativa*) was 45 % and wild grass pollens (*Artemisia vulgaris*, *Urtica dioica*, *Taraxacum vulgare*, *Rumex acetosa*, *Plantago lanceolata*) sensitivity was 20 %. 14 % of patients were sensitive to trees I (*Alnus glutinosa*, *Corylus avellana*, *Populus alba*, *Ulmus scabra*, *Salix caprea*) and 17 % to trees II (*Betula verrucosa*, *Fagus silvatica*, *Quercus robur*, *Platanus orientalis*). *Olea europeae* sensitivity was found at a rate of 30 % and *Pinus silvestris* sensitivity was 14 % and moulds (*Alternaria tenuis*, *Botrytis cinerea*, *Cladosporium herbarum*, *Curvularia lunata*, *Fusarium moniliforme*, *Helminthosporium halodes*, *Aspergillus fumigatus*, *Mucor mucedo*, *Penicillium notatum*, *Pullularia pullu-*

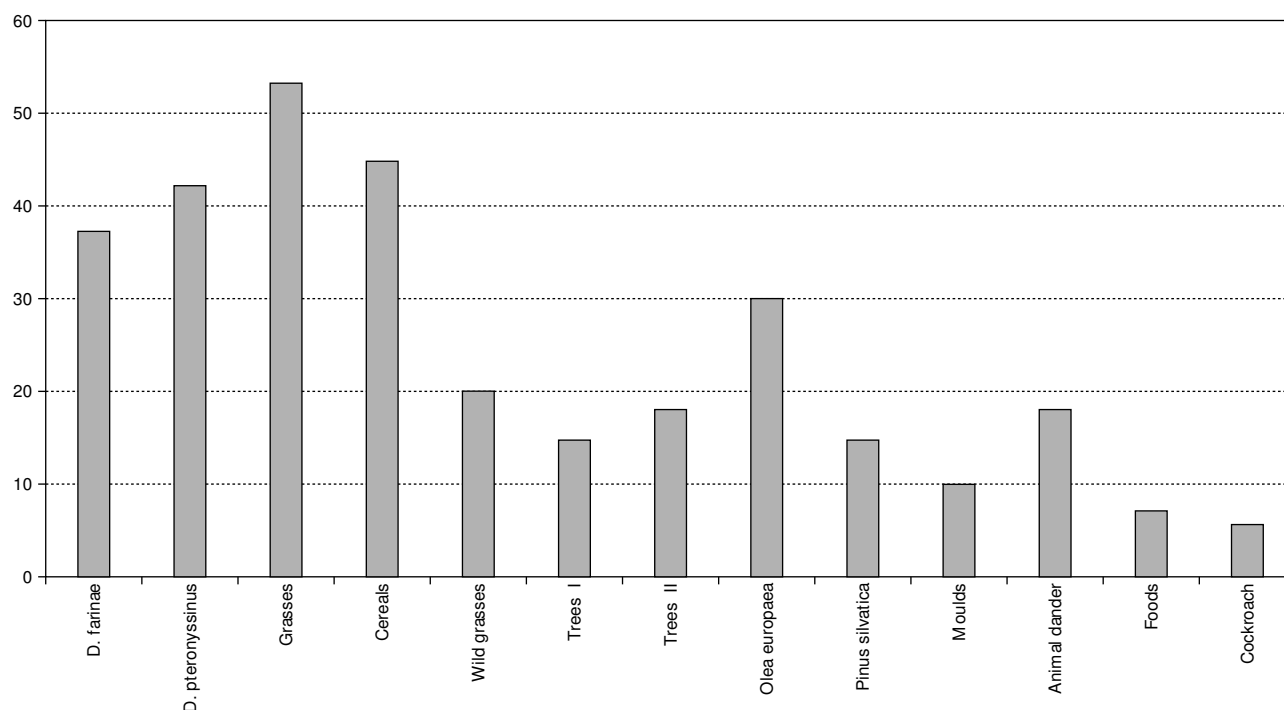


Figure 1.—Epidermal skin tests results.

lans, *Rhizopus nigricans*, *Serpula lacrymans*) sensitivity was 9% and animal danders (Hamster, dog, rabbit, cat, guinea pig) sensitivity was found at a rate of 16%. 6% of the patients were sensitive to foods (banana, cocoa, cow's milk, egg white and yellow) and 5,3% to cockroach (since 1999) (fig. 1).

## DISCUSSION

We evaluated the effects of allergen sensitization and family history of atopy on allergic diseases in Turkish population living in and around İzmir. Atopy is closely associated with asthma, rhinitis, atopic dermatitis and chronic urticaria with adirect and linear relationship. However, the proportion of cases of allergic disease attributable to atopy is approximately 50%.

It is known that there are many allergens which disturb human health. Many allergens like house dust mites, animal danders, pollens, moulds, variable foods, variable drugs (penicillin and streptomycin) are present on the earth. Major allergenic pollens are so well mixed throughout the lower atmosphere that avoidance measures can only hope to curtail expensive exposure. Programs of urban allergenic plant eradication have not been successful because pollens are carried in the wind for great distances. Airborne pollen and spore allergens have been impli-

cated as one of the main cause of allergic respiratory problems in temperate countries<sup>7</sup>. The major allergenic pollens (grasses, weeds and trees) are derived from wind-pollinated pollens rather than from insect-pollinated plants, and the clinically important pollens vary according to location<sup>8</sup>. Sensitivity to pollens was the most frequently detected one in the retrospective evaluation of skin prick tests. This high frequency of sensitivity to pollens may be related to the great variety of plants in our region. Positive skin tests were detected in patients who meet grass and cereal pollens mostly in Aegean region. Pollen grains are absent in the atmosphere on wet days but are frequently released when hot and dry weather conditions prevail. As a consequence, pollen release and atmospheric loading is usually seasonal, with late spring and summer commonly being the times of pollen.

In our region sensitivity to *Olea europaea* was found at a rate of 30%. We can explain this frequency with the lightness of olive pollens. Olive pollens easily become airborne despite extensive insect-pollination. Olive has peak pollination in April and May<sup>9,10</sup>.

That some constituent of the dust in homes could be an aggravant of asthma and rhinitis has been appreciated for over 70 years. House dust mites live in carpets, soft furnishings, and mattresses. They thrive at temperatures of about 25 °C to 30 °C, and relative

humidity of 75-80 %. Viable *D. pteronyssinus* mites are usually not found with relative humidity below 65 %, and mites will definitely be eliminated with persistent humidity below 45 %. *D. farinae* may survive at lower relative humidity at lower temperatures, for example, at humidities of 45 % and temperature at 15 °C<sup>11,12</sup>. The major food source of dust mites is human skin scales, therefore the conditions that contribute to mould growth will also augment mite population. *D. pteronyssinus* and *D. farinae* are both present in Aegean region and Turkey. In our study 42 % of patients were sensitive to *D. pteronyssinus* and 37 % were sensitive *D. farinae*. These results are well-adjusted to the climate features of our region. High positive sensitivity to house dust mites which is detected in our study is thought to be due to the climate features and humidity ratios of Aegean region.

Moulds are important sources of allergens. Most allergenic moulds can grow on nonliving organic matter, while a few require a living host. Both groups need moisture, oxygen, preformed carbohydrate and occasionally additional growth factors. Many familiar moulds grow actively at 20 °C and may flourish well above or below this temperature; others require low temperature, proliferating even under refrigeration. Although fungal components may be ingestant allergens, inhaled spores are the major source of exposure. Depending on the mould spores may be asexual or sexual. The most allergic moulds are *Alternaria*, *Aspergillus*, *Cladosporium* and *penicillium*<sup>13</sup>. Sensitivity to inhaled mould allergens is a common factor in allergic rhinitis and asthma, but the role of fungus materials in urticaria and eczema remains speculative. A study showed 10 of the 11 patients with asthma who had respiratory arrest (91 %) had positive skin puncture tests for sensitivity to *Alternaria*, as compared with 31 % of the control<sup>14</sup>. Evaluation of sensitivity to moulds is difficult because of their diversity, their uncertain regional distribution and often prolonged period of exposure. Prevalence of sensitivity to moulds was not known exactly in epidermal skin prick tests, in some studies 25 % or less sensitivity to moulds in prick tests is detected. In our study 9 % of patients were sensitive to moulds. This ratio is well-adjusted to literature informations. When the difficulty in evaluation of sensitivity to moulds is considered, we think that we are successful in detection of moulds sensitivity.

Animal derived allergens are of major clinical significance in both the home and workplace. In domestic situations, allergy to cats and dogs is particularly prevalent, where as in occupational setting, allergy to rats, horses, rabbits, mice, gerbils and guinea pigs is common. In both settings, the allergens

are derived from dander, epithelium, fur, urine and saliva, although it is possible that the allergens originate from the same sources<sup>15</sup>. In our study, sensitivity to animal dander was found as 16 %. In Western and European countries there is high incidence of domestic pets in homes than our country so sensitivity to animal dander is found to be low in our country and region<sup>16</sup>. But we should not forget that this ratio will increase parallel to the development in socioeconomic and sociocultural situations.

Cockroaches are an important source of indoor allergen, especially in multi-unit housing and in urban areas. Although cockroach allergens are found throughout the house, including beds, furniture and carpets, the highest levels are typically found in the kitchen, and these levels are perhaps the best indicator of cockroach infestation in a house<sup>17</sup>. However, exposure in the bedroom and family room may be more relevant in causing sensitization. Sensitivity to cockroach allergens has been appreciated for over thirty years, but its role as an important factor in asthma has only recently been elucidated<sup>18</sup>. Prevalence of cockroach allergen is inversely related to socioeconomic status. The most diffused species are strictly domestic, not surviving outside<sup>19</sup>. The major cockroach allergens primarily originate in the gut epithelium, with lesser contributions from the Malpighian vessels and ovaries. Exposure may come from feces, saliva or body part fragments<sup>20,21</sup>.

Cockroach sensitivity was found at a rate of 5,3 % among our patients (since 1999). Cockroaches thrive at temperatures of 20-25 °C and relative humidity of 60-75 % in gloomy rooms and especially in the kitchens and bathrooms<sup>22</sup>. Cockroach sensitivity was detected in lower ratio when compared with other allergens. In our conclusion this low ratio is due to high socioeconomic situation in our region. Bostancı et al. was report 4,3 % positive skin test responses to cockroach allergen in a study of 867 pediatric allergy clinic patients living in Ankara, Turkey<sup>23</sup>. However, Mungan et al. have reported a higher rate (25,7 %) in a study performed on adult patients with bronchial asthma in Turkey<sup>24</sup>.

In our study epidermal skin prick tests were evaluated retrospectively in patients who have allergic disease or diseases in İzmir and around. Our data indicate that allergens that may be the cause of the high prevalence of allergic diseases in İzmir are probably produced by pollens and mites.

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