CLINICAL STUDY

EVALUATION OF SKIN PRICK TEST RESULTS IN PATIENTS WITH RESPIRATORY TRACT ALLERGY SYMPTOMS IN THE KADIKÖY DISTRICT OF ISTANBUL

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SUMMARY

Allergic diseases are the result of interactions between genetic and environmental factors. Environmental factors include nutrition, domestic and external respiratory allergens, cigarette smoke, infections, and air pollution. Allergic rhinitis (AR) is a disease characterised by reversible obstruction due to chronic airway inflammation, caused by environmental factors interacting with genetic susceptibility. This study evaluated the prevalence of allergic sensitisation to common allergens, based on SPTs conducted in the Kadıköy District of Istanbul, Turkey. The main goal was to determine the prevalence of skin positivity to different aeroallergens in patients with AR in Istanbul to improve management strategies. This retrospective study included 1,200 patients diagnosed with AR clinically and seen between June 2010 and June 2016 in the Bayındır İçerenköy Clinic. We retrospectively evaluated epidermal SPT results in patients with clinically evident AR residing in Istanbul and its suburbs. We found that 66% of the subjects had at least one allergic reaction. This result is important for allergists aiming to determine strategies for allergy prevention in this region.

Keywords: Allergy, skin test, allergic rhinitis

İSTANBUL KADIKÖY İLÇESİNDE ALLERJİK RİNİT SEMPTOMLARI OLAN HASTALARDA CİLT PRİCK TESTİ SONUÇLARININ DEĞERLENDİRİLMESİ

ÖZET

Allerjik hastalıklar, genetik ve çevresel faktörler arasındaki etkileşimin bir sonucudur. Çevresel faktörler arasında beslenme, ev içi ve dışı solunum alerjenleri, sigara dumanı, enfeksiyonlar ve hava kirliliği sayılabilir. Allerjik rinit (AR), genetik yatkınlıkla etkileşen çevresel faktörlerin neden olduğu, kronik hava yolu inflamasyonuna bağlı geri dönüşlü tıkanıklıkla karakterize bir hastalıktır. Bu çalışmada, İstanbul'un Kadıköy İlçesinde yapılmış olan cilt prick testlerine dayalı olarak, yaygın alerjenlere karşı allerjik duyarlılığın yaygınlığını değerlendirmiştir. Ana hedef, yönetim stratejilerini iyileştirmek için İstanbul'da AR olan hastalarda farklı allerjenlere karşı cilt pozitifliğinin prevalansını belirlemekti. Bu retrospektif çalışmada, klinik olarak AR tanısı alan ve Bayındır İçerenköy Kliniğinde Haziran 2010 ile Haziran 2016 tarihleri arasında görülen 1,200 hasta dahil edildi. İstanbul ve banliyölerinde klinik olarak belirgin AR varlığı olan hastalarda retrospektif olarak epidermal prick testi sonuçlarını değerlendirdik. Deneklerin % 66'sında en az bir alerjik reaksiyon vardı. Bu sonuç, bu bölgede alerji önleme stratejileri belirlemek açısından anlamlı ve önemlidir.

Anahtar Sözcükler: Allerji, cilt testi, allerjik rinit

INTRODUCTION

Allergic diseases are the result of interactions between genetic and environmental factors. Environmental factors include nutrition, domestic and external respiratory allergens, cigarette smoke, infections, and air pollution. Allergic rhinitis (AR) is a disease characterised by reversible obstruction due to chronic airway inflammation, caused by environmental factors interacting with genetic susceptibility[1].

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The approximate prevalence of AR is 20%, but this varies among populations and cultures, due to differences in genetic and environmental factors, and to geographic differences in the type and potency of allergens and the overall aeroallergen burden. Surveys conducted in different parts of the world have determined the prevalence of different aeroallergens.

The prevalence of AR varies widely among countries and regions[2]. In Turkey, the prevalence of AR differs significantly among cities and regions. Generally, AR is more frequent in coastal areas, cities, large metropolitan areas, and areas with a lower socioeconomic status.

AR, a common problem in childhood and adolescence, can be induced by different mechanisms and may involve several different etiological agents.

AR is characterised by nasal congestion, rhinorrhoea, sneezing, itching of the nose, and postnasal drainage[3]. It is common worldwide and significantly impacts on the quality of life of affected persons. AR has been described as one of the three most important public health problems worldwide[4,5]. Typically, patients are diagnosed with AR based on the presence of symptoms of rhinitis and sensitisation[6]. The most frequently involved allergens are house dust mites, grasses, tree and weed pollens, cat and dog dander, and moulds. Seasonal AR is commonly caused by seasonal pollens and outdoor moulds. Perennial AR is typically caused by allergens within the home, but can also be due to outdoor allergens that are present year-round. According to the guidelines of Allergic Rhinitis and its Impact on Asthma (ARIA), AR is deemed to be present if two or more symptoms (rhinorrhoea, nasal itching, nasal blockage, and sneezing) are present in a patient, for at least 1 hour per day for 4 or more days a week and for 4 or more weeks a year[4-7].

This study evaluated the prevalence of allergic sensitisation to common allergens, based on skin prick test (SPT) conducted in the Kadıköy District of Istanbul, Turkey. The main goal was to determine the prevalence of skin positivity to different aeroallergens in patients with AR in Istanbul to improve management strategies.

MATERIAL and METHODS

This retrospective study included 1,200 patients diagnosed with AR clinically and seen between June 2010 and June 2016 in the Bayındır İçerenköy Clinic. On admission, the patients completed a detailed questionnaire regarding their AR symptoms, such as sneezing, pruritus, rhinorrhoea, and nasal congestion. Diagnoses were based on AR symptomatology and clinical examinations. After anterior and posterior nasal endoscopic examinations, the patients underwent skin tests pertaining to inhalant allergens.

The study was approved by the Clinical Ethics Committee and written informed consent was obtained from all participants.

Skin tests

The test results of 1,200 patients, who underwent SPT with a tentative diagnosis of AR at the Bayındır İçerenköy ear, nose and throat (ENT) clinic between June 2010 and June 2016, were evaluated. The skin tests were performed using the allergen solutions “multitest” (Stallergenes Greer, Turkey).

The allergen extracts used in the tests were as follows: 1) histamine (positive control); 2) normal saline (negative control); 3) Dermatophagoides farinae (“Mite-I”); 4) D. pteronyssinus (“Mite-II”); 5) a pollen (cereal) mixture; 5) pollen (herb mix); 6) alder, hazelnut, poplar, elm, and willow trees (“Trees-I”); 7) birch, beech, oak, and plane trees (“Trees-II”); 8) Alternaria alternate; 9) a Cladosporium mixture; and 10) an Aspergillus mixture. A 10-point scale was used to rate allergy severity. Correlations between allergy test values and patient complaints were measured.

Grading of allergic reactions

A positive reaction occurs when the skin becomes itchy within 15 minutes, and then becomes red and swollen with a weal in the centre. Reactions can be graded as follows: + = no weal with only 3 mm flare; ++ = 2 to 3 mm weal with flare; +++ = 3 to 5 mm weal with flare, and ++++ = > 5 mm weal and possible pseudopodia. Only patients with completely negative SPT results are regarded as non-allergic.

Statistical analysis

The Number Cruncher Statistical System 2007 (NCSS Statistical Software, Kaysville, Utah, USA) was used for the statistical analysis. Descriptive statistics (mean, standard deviation, frequency, percentage, and range) were obtained for the analysis. Pearson’s chi-square test was used to compare qualitative data. Statistical significance was accepted as $p<0.05$.

RESULTS

The 1,200 patients had a mean age of 36.23 ± 15.33 years (range: 5–80 years) and comprised 704 (58.7%) women and 496 (41.3%) men. Of the patients, 98 (8.2%) were primary school graduates, 216 (18.0%) were middle school graduates, 68 (5.7%) were high school graduates, and 818 (68.2%) were university graduates.

Regarding employment, 58.7% (n = 704) of the patients were bankers, 20.6% (n = 247) students, 12.8% (n = 154) were housewives, 5.0% (n = 60) (n = 26) were self-employed, 0.4% (n = 5) were nurses, and 0.3% (n = 4) not working.

Overall, 435 (36.3%) patients were positive for house dust allergy, of whom 21 (1.5%), 156 (13.1%), 120 (10.1%), and 138 (11.6) had reactions that were graded as +1, +2, +3, and +4, respectively.

Herb allergies were detected in 288 (24%) patients, of whom 22 (1.8%), 134 (11.2%), 59 (4.9%), and 73 (6.1%, had reactions that were graded as +1, +2, +3, and +4, respectively.

Tree allergies were observed in 271 (2.6%) patients, of whom 29 (2.4%), 150 (12.5%), 68 (5.7%), and 24 (2%) had reactions that were graded as +1, +2, +3, and +4, respectively.

Of the patients, 800 (66.7%) had at least one positive allergy test result, including 435 (54.4%) who reacted to house dust, 288 (36.0%) who were allergic to tree pollens, and 245 (30.6%) who were positive for moulds. There were no significant differences in the incidence of tree and house dust allergy positivity among age groups ($p>0.05$).

There was a significant difference among the age groups in the incidence of mould allergy ($p<0.001$), which was more prevalent in patients aged 30–39 years than in those aged 10–19 or 60–69 years ($p=0.005$, $p<0.001$, and $p=0.017$, respectively).

There was a significant difference among the occupational groups in terms of the incidence of mould allergy ($p=0.006$). The incidence of mould allergy was highest in bankers, and lowest in students ($p=0.001$ and $p=0.004$, respectively). There was a significant difference in the incidence of positivity for any allergen among the occupational groups ($p=0.037$). The incidence of positivity for any allergen was highest in private sector employees ($p=0.010$).

There was a significant difference in the incidence of mould allergy among groups distinguished according to a combination of age and gender ($p<0.003$). The incidence of mould allergy was lowest in males between 10 and 19 years of age, and highest in females between 30 and 39 years of age ($p=0.028$ and $p<0.001$, respectively).

Table 1: Descriptive Properties

		Min-Max	**Mean±ss**
Age (year)		5-80	36.23±15.33
		n	**%**
Sex	Female	704	58.7
	Male	496	41.3
Education	Primary	98	8.2
	Middle	216	18.0
	Highschool	68	5.7
	University	818	68.2
Occupation	Banker	704	58.7
	Student	247	20.6
	House wife	154	12.8
	Private Sector	60	5.0
	Freelancer	26	2.2
	Nurse	5	0.4
	Teacher	4	0.3

Table 2: Distributions of allergens

Allergen			**n**	**%**
House Dust	Negative		765	63.7
	Positive		435	36.3
		1+	*18*	*1.5*
		2+	*157*	*13.1*
		3+	*121*	*10.1*
		4+	*139*	*11.6*
Herb	Negative		912	76.0
	Pozitive		288	24.0
		1+	*22*	*1.8*
		2+	*134*	*11.2*
		3+	*59*	*4.9*
		4+	*73*	*6.1*
Tree	Negative		929	77.4
	Pozitive		271	22.6
		1+	*29*	*2.4*
		2+	*150*	*12.5*
		3+	*68*	*5.7*
		4+	*24*	*2.0*
Mold	Negative		955	79.6
	Pozitive		245	20.4
		1+	*33*	*2.8*
		2+	*133*	*11.1*
		3+	*60*	*5.0*
		4+	*19*	*1.6*
Positive for at least one allergen	Yes		800	66.7
	No		400	33.3

Tablo 3: Assessment of any allergen positivity by age, gender and occupation

		Positive for any allegen			
		No	**Yes**	**[a]p**	**Post-hoc**
		n (%)	**n (%)**		
age	**<10 year**	16 (33.3)	32 (66.7)		
	10-19 y	41 (35.7)	74 (64.3)		
	20-29 y	75 (33.5)	149 (66.5)		
	30-39 y	115 (29.0)	281 (71.0)	0.085	-
	40-49y	59 (33.5)	117 (66.5)		
	50-59 y	41 (33.3)	82 (66.7)		
	60-69 y	45 (42.9)	60 (57.1)		
	>70 y	8 (61.5)	5 (38.5)		
Sex	**Female**	234 (33.2)	470 (66.8)	0.950	-
	Male	166 (33.5)	330 (66.5)		
Occupation	**Banker**	244 (34.7)	460 (65.3)		0.345
	House wife	59 (38.3)	95 (61.7)		0.183
	Student	75 (30.4)	172 (69.6)	**0.037***	0.229
	Private sector	11 (18.3)	49 (81.7)		**0.010***
	Freelancer	11 (42.3)	15 (57.7)		0.341

[a]Pearson ki-kare test *p<0.05

Table 4: Assessment of any allergen positivity between age and sex groups

	Positive for any allergen		
	NO	**Yes**	**[a]p**
	n (%)	**n (%)**	
<10 yeat& female	8 (32)	17 (68)	0.430
<10 y & male	8 (34.8)	15 (65.2)	
10-19 y & female	18 (34.6)	34 (65.4)	
10-19 y & male	23 (36.5)	40 (63.5)	
20-29 y & female	50 (35.7)	90 (64.3)	
20-29 y & male	25 (29.8)	59 (70.2)	
30-39 y & female	64 (27)	173 (73)	
30-39 y & male	51 (32.1)	108 (67.9)	
40-49 y & female	36 (34)	70 (66)	
40-49 y & male	23 (32.9)	47 (67.1)	
50-59 y & female	24 (32.9)	49 (67.1)	
50-59 y & male	17 (34)	33 (66)	
60-69 y & female	29 (46)	34 (54)	
60-69 y & male	16 (38.1)	26 (61.9)	
>70 y & female	5 (62.5)	3 (37.5)	
>70 y & male	3 (60)	2 (40)	

[a]Pearson ki-kare test *p<0.05

DISCUSSION

Allergic diseases are caused by the effects of environmental allergens in genetically susceptible (i.e. atopic) individuals. Allergen exposure via the mouth or skin triggers the development of allergic diseases in atopic patients[8]. Air-borne pollen and spore allergens are implicated as being among the main causes of allergic respiratory disorders in countries with temperate climates. The major allergenic pollens (grasses, weeds, and trees) are from wind-pollinated rather than insect-pollinated plants and the most clinically important pollens vary by geographical region. Sensitivity to pollens was the leading cause of positive test results in our retrospective evaluation of SPT results[9,10]. This high frequency of pollen sensitivity may be related to the wide variety of plants that grow in Turkey.

In many studies, the highest rate of prick test positivity was found for house dust mites. Allergy testing can be performed in three different ways: mucosal challenge, skin tests, and in vitro tests. Epicutaneous (prick or puncture) and intracutaneous (intradermal) applications of potential allergens are useful clinical methods of allergy testing. Using any of these methods, an allergen-specific response can be measured qualitatively or quantitatively. The SPT is a standardised test that is widely used to diagnose suspected cases of immunoglobulin E (IgE)-mediated allergy. It is considered the gold standard method for diagnosing allergy. SPT (single or multiple pricks) is also relatively safe, well controlled, and has a long track record of success. Generally accepted indications for SPT include AR, asthma, atopic dermatitis, suspected food allergies, latex allergy, and conditions in which specific IgE is thought to play a role in the pathogenesis. SPT provides information about the presence of specific IgE to protein and peptide antigens (allergens). Identification of common aeroallergens in a given area is necessary to educate patients on what allergens to avoid, and to help identify the optimal allergen immunotherapy for effective AR treatment[11,12].

The reported rate of allergy was 42% in Tezcan et al., 22.5% in Tunalı et al., and 11.63% in Öğretmen et al.[13-15] In this study, we found similar allergy rates. Istanbul, the largest city in Turkey, is located at the junction between southeast Europe and west Asia. The climate in Istanbul is Mediterranean and the average annual temperature is 13.7°C. The humidity is constantly high, which creates ideal conditions for a variety of plants. The climate is also ideal for the generation of a wide array of pollens. High pollen sensitivity has already been observed in studies conducted in other regions of Turkey. Allergic diseases are caused by weed and tree pollens. Allergen types vary in prevalence by geographical region. For example, sensitivity to olive tree pollen was detected in 30% of participants in a

study conducted in İzmir versus 7% in a study in Eskişehir.

In summary, we retrospectively evaluated epidermal SPT results in patients with clinically evident AR residing in Istanbul and its suburbs. We found that 66% of the subjects had at least one allergic reaction. This result is important for allergists aiming to determine strategies for allergy prevention in this region. Nevertheless, larger-scale, multi-centre studies with more patients are needed for more detailed characterisation of allergens in Istanbul.

The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate, please see:

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