The Incidence of the Epidemiological Markers of Allergy in Adults

Erişkinlerdeki Alerjilerde Epidemiyolojik Göstergelerin İnsidans

Erişkinde Alerji / Allergy in Adult

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Özet

Amaç: Alerjik rinit ve astım, immün sistemi etkileyen yaygın sağlık problemleridir. Bu çalışmada, subkutan spesifik alerjen immunoterapi tanısıyla tedavi edilen, alerjic rino-konjonktivit ve astım hastalarının epidemiyolojik göstergeleri ve laboratuvar durumları değerlendirilmiştir. Gereç ve Yöntem: Çalışma 626 hastayı içermektedir. Katılımcıların, sosyodemografik özellikleri ve alerji öyküleri değerlendirilmiştir. Total ve spesifik IgE düzeyleri , ImmunoCAP kit kullanılarak immunoassay metodu ile değerlendirilmiştir. Deri prick testleri (SPT) kaydedildi. Bulgular: Total Ig E düzeyleri 307.6 ± 14.5 kU/L. Hastaların %25.6' i , 30-39 yaş grubundaydi. alerjik rinit ve astım semptomlarının alevlenmesinde yaygın irritanlar, hava polenizasyonu (%77.0) ve ikinci olarak ev tozu akarı (%76.2) bulunmuştur. Vakaların SPT leri değerlendirildiğinde , deri testleri değerlendirildiğinde, yabani ot pozitifliği artan yaşla azalmaka olduğu görülmüştür (p<0.001). Sigara içenlerde ot, küf ,epidermal prik pozitifliği istatistiksel olarak anlamlıdır. Tartışma: Alerjik hastalıklarda; alerjenler bölgesel değişiklik göstermektedir. Bu nedenle; Deri prick testler , bölgenin alerjen profilellerini içermelidir.

Anahtar Kelimeler

Alerjenler; Alerjik Rinit; Alerjik Konjuktivit; Alerjik Astım, Subkutan Spesifik Alerjen İmmunoterapi

Abstract

Aim: Allergic rhinitis and asthma are a common health problem affecting the immune system.In this study, the epidemiological markers and laboratory Status were evaluated in subcutaneous specific allergen immunotherapy-treated patients diagnosed with allergic rhino-conjunctivitis and asthma. Material and Method: 626 patients were enrolled in the study. The sociodemographic characteristics and allergen history of the participants were obtained. The total and specific IgE levels were detected by fluoroenzyme immunoassay method via use of ImmunoCAP kit. The skin prick tests (SPT) were recorded. Results: Total Ig E level was 307.6 ± 14.5 kU/L. Age of 25.6 % of the patients was between 30-39 years. The most common irritant that exacerbates the allergic rhinitis and asthma symptoms was air pollution (%77.0) and house dust ranks second (%76.2). The SPT of the cases were evaluated taking the age groups into account and this revealed an decreased rate of positivity to the prick test for plants and cereals with increasing age (p<0.001). Among smokers grass, mold ,epidermal prick positivity was significant. Discussion: In allergic diseases; allergens may have regional variations. That's why; the allergen profiles of the regions must be determined and the dermal Prick tests must be prepared accordingly.

Keywords

Allergens; Allergic Rhinitis; Allergic Conjunctivitis; Allergic Asthma; Subcutaneous Specific Allergen Immunotherapy

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Introduction

Allergy can be defined as a detrimental immune-mediated hypersensitivity response to common environmental substances. The immune processes of allergy usually rely on the production of IgE antibodies specific to common allergens. Allergic diseases are caused by the activation of mast cells and basophils through cell-surface-bound IgE. This causes the release of histamine and other mediators, leading to allergic inflammation [1]. Allergic diseases have a significant impact on the quality of life and wellbeing of the individual. It affects learning performance in school-aged individuals and work productivity in adults. It imposes a significant burden on the economy of countries in the form of rising healthcare costs and reduced productivity through lost man-days [2]. The manifestation of allergic diseases changes throughout life: food allergies and eczema are most likely to develop in infants, asthma in young children, and rhinitis in older children and adults [3]. Allergic rhinitis is a common disease in the community. Allergic rhinitis manifests in two forms, as seasonal and perennial allergic rhinitis. The asthma disease was more common in people living in slums and housewives [4-6]. Allergic diseases are caused by complex interactions between genetic and environmental factors. Allergic diseases; being more common in identical twins and those with a family history of atopy, suggest the effect of genetic factors [7]. In many epidemiological studies the relationships between allergic rhinitis and diet, hygiene, life-style has been reported. The increase in the prevalence in many industrialized countries shows the effect of environmental factors on the development of allergic rhinitis [6]. Allergic rhinitis affects social life, quality of life and the efficiency of employment of patients; negatively [8,9]. Psychological problems may occur in patients with severe symptoms. Allergic rhinitis has significant socio-economic costs [4-11]. Antalya region has many types of herbs that are known to cause allergic diseases, including plants, trees and vegetation. Antalya's warm and humid climate provides an ideal living environment for mites and cockroaches. In addition, Antalya is a rapidly developing and industrializing region in recent years. In this study, the clinical and laboratory status were evaluated in subcutaneous specific allergen immunotherapy-treated patients diagnosed with allergic rhino-conjunctivitis and asthma.

Material and Method

The study was conducted in Antalya between 10th of November 2009 and 20th of September 2010. The cases having allergen spesific subcutaneous immunotherapy due to allergic rhino-conjunctivitis or asthma were included.

A questionnaire made by the investigators taking the latest literature data into consideration were used during the study. Fourteen questions were asked to the participants. These data were oriented to determine the socio-demographic characteristics and included the age, gender, educational status, place of living, status of social security service achieving, past medical history, diseases that they had, start of the symptoms, duration of the symptoms, irritants and allergens that exacerbate the disease, smoking status, the fuel used for heating the house, the furniture that they used in the living and the dining rooms, presence of cockroaches at home. After obtaining written informed consent of the patients, dermal pick test was performed and the levels of total and specific Immune-globulin E (Ig E) levels were determined. The local ethical committee approval was provided before the beginning of the study.

Laboratory Methods: the total and specific IgE levels were made by fluoroenzyme immunoassay (ImmunoCAP-FEIA) method via use of ImmunoCAP (Phar-macia, Uppsala, Sweden) kit. The values above 100 kU/L and 0.35 kU/L for the total and specific IgE levels were considered abnormal; respectively.

Dermal prick tests:

Skin prick tests on the forearm were performed in all patients using standardized latex extract containing high ammonia natural rubber latex, and a full set of 10 common In addition, venom SPT was performed on one patient based on the subject's clinical history. SPTs were performed by skilled nursing personnel. Positive tests were counted as wheals of 3 mm in diameter after 20 minutes. Tests were compared with positive histamine controls and negative saline controls. Commercial extracts used were manufactured by Allergopharma Nova Helisen (German).

Allergic rhinitis and asthma diagnoses were based on history, physical examination, high eosinophyl count, total and specific IgE levels, respiratory function tests and dermal prick test results. In history, presence of cough spells, nasal drainage, nasal obstruction, itching sensation in the nose, tearing and itching in the eye,; in physical examination pale and hypertrophic conchas, pale nasal mucosa, and presence of nasal serous secretions were used for determining presence of allergic rhinitis. Cases with symptoms suggesting allergic rhinitis, with eosinophylia and prick test positivity were diagnosed as having allergic rhinitis. Cases with allergic rhinitis symptoms, but with low prick test possibility; specific IgE levels were used to confirm the diagnosis and allergen specific subcutaneous immunotherapy was started.

Statistical evaluation of the data

The statistical data derived were evaluated by using 14.00 SPSS software. Ki-Square test and percent ratios were used for data analysis. A p value less than 0.05 was assumed for statistical significance.

Results

During the study 626 patients were included. The descriptive data for the patents are given in Table 1. Fifty-five percent of the cases were female. Among patients %25.6 belonged to 30-39 years age group, and % 43 had University degree graduate. Among the cases who had vaccination 17.1% were current smokers. Among cases %93.9 lived in the city center of Antalya province. Among the study group %41.8 used electric powered devices for heating the house in winter, and %96.8 had carpets at home.

The total duration of the allergic rhinitis was 7.2 ± 0.2 years, and the mean duration of the disease at the start of the immunetherapy was 4.3 ± 3.6 years. The total Ig E level was 307.6 ± 14.5 kU/L (Table.2).

As seen in Table 3 the most common allergen was plant and cereal pollens (%76.8).

The most common irritant that exacerbates the allergic rhinitis and asthma symptoms was air pollution (%77.0) and house dust

Table 1. Socio-demographic characteristics of the study group (n=626)

Variables	n	%
Gender		
Male	281	44.9
Female	345	55.1
Age		
<19	4	0.6
20-29	158	25.2
30-39	160	25.6
40-49	151	24.1
50-59	102	16.3
60+	51	8.2
Educational status		
illiterate+literate	5	0.8
Primary school	87	13.9
Secondary school	31	5.0
High school	234	37.3
University	269	43.0
Smoking status		
Smoker	107	17.1
Non-smoker	519	82.9
Residence		
Urban	588	93.9
Rural	38	6.1
Warm-up tool used at home*		
Electric Stove	262	41.8
Air conditioner	240	38.3
Wood stove	151	24.1
Central heating	140	22.4
Coal stove	52	8.3
Catalytic stove	13	2.1
Some materials used at home*		
Carpet	606	96.8
Cloth seats	522	83.4
Wool quilt	462	73.8
Blanket	437	69.8
Rug	288	46.0
Noting	15	2.4

* More than one choice marked

Table 2. The mean of some variables in the study group (n = 626)

Variables	X ± SEM
Duration of disease (year)	7.2 ± 0.2
Total IgE	307.6 ± 14.5
Duration of immunotherapy (year)	4.3 ± 3.6

ranks second (%76.2) (Table 3).

Among specific Ig E groups the most common positive panel was the mixed simple respiratory panel (%77.0). the positivity for cockroaches were not associated with the presence of cockroaches at home (p>0.05). Grass- grain group was the most common positive prick test (%61.8) (Table 4).

The prick tests of the cases were evaluated taking the age groups into account and this revealed an decreased rate of positivity to the prick test for plants and cereals with increasing age (p<0.001) (Table 5). There was no significant relation of the age to the other prick test parameters. Also the prick test

Table 3. The allergy-causing substances in the study group (n = 26)

Variables	Number	%
Which allergens disturb you?*		
Pollen	481	76.8
House dust	464	74.1
Animal	70	11.2
Mold	69	11.0
Cockroaches	21	3.3
Tree	14	2.2
Which irritants disturb you*		
Air pollution	482	77.0
mite	477	76.2
Cigarette	381	60.9
Perfume	356	56.9
Detergent	346	55.3
Tang	332	53.0
Gas	96	15.3
Steam	31	4.9
Pollen	10	1.6
none	30	4.8
Specific IgE*		
Simple mixed Respiratory Panel test	482	77.0
Mite	382	61.0
Grass	293	46.8
Tree	195	31.1
Food mixture	192	30.7
Grass-grain	190	30.3
Cockroaches	19	3.0
Cat	5	0.8
Mold	5	0.8
Dog	2	0.3
Have you ever seen the cockroaches in your house?		
Yes	100	16.0
No	526	84.0

* More than one choice marked

results were not associated to gender.

Among smokers wood, mold epidermal prick positivity was significantly different from the other groups. (Table 6-7-8). However smoking did not effect plant and cockroach prick test positivity.

Discussion

Allergic diseases are most likely due to complex interactions between largely unknown genetic and environmental factors. The micro-array techniques for the detection of specific IgE has improved the diagnostic procedures for allergic diseases. Allergen- spesific immunotherapy has been used in the management of allergic diseases for nearly 100 years. The quality of allergen products is a key issue for both diagnosis and therapy [9-11].

This method also allows to define sensitization profiles from an epidemiological point of view A detailed knowledge of the sensitization pattern may have relevant implications for the prescription of specific immunotherapy. It is shown that the factors responsible for the increased rate of allergic diseases in city centers are the improvement of hygienic conditions, the decreased rate of infections in the infancy and childhood, sed-

Table 4. Prick test results of the study group (n = 626)

Prick test	Number	%
Grass - Wild Grass-grain Prick		
Positive	387	61.8
Negative	239	38.2
Tree Prick		
Positive	217	34.7
Negative	293	46.8
Olive	116	18.5
Mite Prick		
Positive	378	60.4
Negative	248	39.6
Cockroaches Prick		
Positive	276	44.1
Negative	350	55.9
Mold Prick		
Positive	206	32.9
Negative	420	67.1
Epidermal Prick		
Positive	234	37.4
Negative	392	62.6

Table 5. The grass-grain prick test results of participants according to age groups.

Age Groups	Positive		Negative		Total	
	n	%*	n	%*	n	%**
<29	119	73.4	43	26.6	162	25.8
30-39	110	68.7	50	31.3	160	25.6
40-49	92	60.9	59	39.1	151	24.1
50-59	51	50.0	51	50.0	102	16.3
60+	15	29.4	36	70.6	51	8.2
TOTAL	387	61.8	239	38.2	626	100.0

* Row percentage ** Column percentage (X^2= 41.3; p<0.001)

Table 6. The tree prick test results of participants according to smoking status

Smoking Status	Positive		Negative		Total	
	n	%*	n	%*	n	%**
Smoker	38	35.5	69	64.5	107	17.1
Non-smoker	295	56.8	224	43.2	519	82.9
TOPLAM	333	53.2	293	46.8	626	100.0

*Row percentage ** Column percentage (X^2= 16.2; p<0.001)

Table 7. The mold prick test results of participants according to

Smoking Status	Positive		Negative		Total	
	n	%*	n	%*	n	%**
Smoker	25	23.4	82	76.6	107	17.1
Non-smoker	181	34.9	338	65.1	519	82.9
TOTAL	206	32.9	420	67.1	626	100.0

*Row percentage ** Column percentage (X^2= 5.3; p<0.05)

entary life and increase in the duration of time spent indoors [7-11]. The results of the epidemiological studies seem to support this opinion and is known as “hygiene hypothesis”. That’s why allergic disease occur more often in places with high socioeconomic status that is industrialized and places where multiimmunization is performed and where mycobacterial infections do not occur [10-14]. In our study 93.9% of the cases lived in

Table 8. The Epidermal prick test results of participants according to smoking status

Smoking Status	Positive		Negative		Total	
	n	%*	n	%*	n	%**
Smoker	28	26.2	79	73.8	107	17.1
Non-smoker	206	39.7	313	60.3	519	82.9
TOTAL	234	37.4	392	62.6	626	100.0

*Row percentage ** Column percentage (X2= 6.9; p<0.01)

the city center of Antalya. University should begin with lower case initial.

In allergic rhinitis most commonly determined allergens are mites, and pollens rank second [10-14]. The prevalence study that we had conducted revealed allergens that were determined by prick test as 51.8% house dust, 42.3% pollens in the region [4]. In the cases that had immune-therapy pollen positivity rate was 61.8%, and house dust positivity rate was 60.4%. Mediterranean region has a flora that includes a variety of grass, plants and trees that are known to cause allergic diseases. The climate being hot and humid causes the pollination period to last longer and may exacerbate the patient symptoms. The increase in air pollution has caused an increase in the symptom in the last 2 or 3 years. Particularly; this finding was more evident in the winter season.

In the study the prick test results of the cases were evaluated according to the age groups and the prick test positivity rate decreased with increased age groups for grass and cereals (p<0.001). The other prick test parameters were not influenced with increasing age. In the study group gender did not cause significant difference in terms of prick test results.

Allergic rhinitis is a disease of the nasal mucosa that is mediated via IgE. Interaction of IgE with allergen in the nasal mucosa causes a variety of mediators to release that causes typical symptoms. In allergic rhinitis patients whatever the allergen is, the cigarette smoke, air pollution irritants, and heavy odors cause an increase in the symptoms due to nasal hyperactivity. In our study; 17.1% of the cases were active smokers. Among cases 60.9% had increased symptoms with cigarette smoke. We think that in allergic patients, avoidance from active and passive smoke will be effective in reducing the symptoms. In smokers we have found significant differences in wood, mold and epidermal prick test results.

The duration of allergic rhinitis was 7.2 ± 0.2 years and the start of immune-therapy happened 4.3 ± 3.6 years after the diagnosis. Most of the cases had said that the rhinitis symptoms were due to pollens and house dust. Also the cases have said that their symptoms got worse with exposure to dust, smoke, heavy odors, perfumes, and detergents. Most of the patients have said that air pollution was the most important factor that exacerbated the symptoms of rhinitis and asthma (77.0%). The second most common irritant was house dust (76.2%). The cases in the study group seem to be aware of their clinical condition. As in all chronic diseases knowing what is harmful and what is good for their health helps the cases to cope with their disease more easily. Pollen allergies differ according to pollens present in the atmosphere related to the flora of the region, the duration of presence of these pollens in the atmosphere and the duration of exposure of the person to these allergens. Pollen allergies do

generally cause seasonal allergic rhinitis [15-17]. In the city of Mersin, where the climate and the flora have the same characteristics as in Antalya, most frequently detected allergens in a study causing allergic rhinitis were dust mites and pollens [16]. In our study in the region that we live the most frequent allergens were grass/cereal mixture and dust mites. In the region of Antalya the prevalence for olive allergy was 11% and in our allergen immunotherapy patients rate of sensitivity to olive was 18,5% [18]. Since olive trees are mostly present in our region, higher prevalence for olive allergy in our allergic rhinitis patients is important for pointing out the effect of environmental factors in the natural course of the disease.

Desloratadine (DCL) is a non-sedating antihistamine approved for the treatment of allergic rhinitis. In our study groups of had a DCL usage history during the exacerbation phase on May and November. So that the blood samples from the patients obtained on January during they were having minimum allergic symptoms . Mast cells (MC) play a key role in allergy and are involved in several chronic inflammatory diseases. Furthermore, they are involved in innate immunity and in tissue repair [19-21]. The regulation of MC numbers, as of any other normal cells, depends on both their generation rate and survival time within tissues. Many factors regulate MC viability [21]. The critical event in allergic reactions is allergen-induced crosslinking of specific IgE molecules bound to Fc_RI receptors on the MC surface, which triggers MC degranulation and release of inflammatory mediators. Non-IgE-mediated activation may also contribute to continued degranulation of MC during the late phase of allergic reactions [19-25]. In this study, IgE levels was 307.6 ± 14.5 kU/L. The values of the research group before allergen spesific subcutaneous immunotherapy.

Cockroaches live in places with temperature of 20-25 °C and with a relative humidity of 60-70%, especially in kitchens and bathrooms. It is hard for them to survive in less humid places and places with scarce amount of food residues [4]. In our country there are 20 different species of cockroaches. Among these Cockroach (Blatella Germanica) is the one with the most immunological potential. Cockroach lives confined to houses and can't survive outside. In the studies conducted in allergic rhinitis patients sensitivity for cockroaches are reported to be 14,7-26,1% [13, 14]. In our country atopic sensitivity rate for cockroaches in adult asthma patients vary between 4,3% and 36% [22]. Detection of cockroaches in the house and dermal test results had no significant association ($p>0.05$). Cockroaches especially are detected at nights and may be unnoticed by the household members during the day times.

Allergic rhinitis can start at childhood. The prevalence in Turkey among primary school children is 17% [22]. The diagnosis of allergic rhinitis is generally made at ages before 40. The data about the frequency among elderly population is scarce. In a study conducted by Dottorini et al. [23]. that was longitudinal in design the frequency of allergic rhinitis diagnosis is lower after age of 60 compared to youngsters [24]. In our study we have seen that the allergic rhinitis symptoms began at childhood, most of the patients had their diagnoses at their 2nd 3rd and 4th decades of their life; and the diagnosis rate of the disease at older ages was lower. In our country, with increasing age the time spent indoors increases dramatically. That may effect especially exposure to pollens. This may be the reason to have diminished rate of positive Prick test results before the immune-therapy. The age distribution of the allergic rhinitis patients are similar to the previously published data.

Though allergic rhinitis is an chronic inflammatory disease many of the patients do not have regular treatment or have no treatment at all. Since the present drugs especially inhaled corticosteroids are highly effective in allergic diseases and asthma it had been hard to develop new drugs in the market. Despite those; since severely asthmatic patients are not well controlled in safe doses of steroids new drugs are needed. Today for allergic diseases many drugs are developed or under development. Some of these drugs include inhibitors of pro-inflammatory cytokines, anti-IgE antibodies, drugs blocking adhesion molecules and immune-biological agents like chemokin inhibitors [27].

Though allergic rhinitis is a chronic inflammatory disease many patients have no regular treatment or have no treatment at all. Many drugs are already developed or under development for treatment of allergic diseases. Some of these drugs include inhibitors of pro-inflammatory cytokines, anti-IgE antibodies, drugs blocking adhesion molecules and immune-biological agents including e.g. chemokine inhibitors [28]. Many studies have suggested markers which will enable us to monitor clinical improvement. Our earlier studies provided a novel perspective on allergic asthma and the effect of anti IgE treatment, using as markers serum soluble TNF-related apoptosis-inducing ligand, total antioxidant capacity, hydrogen peroxide, malondialdehyde total nitric oxide concentrations and ceruloplasmin oxidase activity measurements [29-32]. Taken together, our results and those of others suggest that characterization of the specific receptor systems activated, and the pro-inflammatory factors regulated, by TRAIL in vivo may lead to the development of novel therapeutic strategies for diseases as diverse as allergy [29,33]. The sTRAIL levels were decreased after allergen- spesific immunotherapy as to healthy individuals' levels. be a marker of efficacy of immunotherapy in allergic rhinoconjunctivitis patients [33,34].

When allergic rhinitis diagnosis is made; a detailed history, physical examination with determination of the factors that trigger allergic rhinitis and measures to avoid the contact to the allergens must be performed.

In Antalya, mostly grass and cereal mixtures and mites are responsible for the allergic rhinitis cases. The other important allergens that are linked to the flora and climate of the region are olive and the cockroaches. High asthma prevalence in people living in shanties and in housewives may be due to exposure to house dust mites. In allergic diseases; allergens may have regional variations. That's why; the allergen profiles of the regions must be determined and the dermal Prick tests must be prepared accordingly.

Competing interests

The authors declare that they have no competing interests.

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