Research Article / Araştırma Makalesi

Demographic Features And Allergic Sensitization of Patients with Respiratory Symptoms

Solunumsal Semptomları olan Hastaların Demografik Özellikleri ve Alerjik Duyarlılıkları

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Abstract: The prevalence of allergic airway diseases are increasing worldwide. Adressing the responsible allergen is crucial to take precautions and treat patients. The aim of this study is to evaluate the demographic and clinical features of patients with suspected respiratory allergies. Medical reports of adult patients admitted to outpatient clinic of immunology and allergic diseases were retrospectively screened. Patients those had at least one of the following complaints and/or symptoms of rhinorhea, nasal itching, sneezing, nasal obstruction, shortness of breath, chest tightness, phlegm, cough, itchy eyes were recruited to study. Demographic and clinical features were recorded. Atopy status was determined with skin prick test and/or serum specific IgE levels. Of the 986 patients recruited, majority was female (73.32%). 70.38 % patients had rhinitis, 14.40 % had patients rhinitis and asthma, 3.54 % patients had asthma, 11.66% patients had nonspesific airway symptoms. Atopy was determined in 426 (43.20 %) patients, house dust mite (HDM) and Parietaria were the most frequent allergens. Almost half of the patients with rhinitis and asthma were atopic (48.32%, 51.97%, respectively). Patients those had hypersensitivity to Parietaria, a weed pollen, had perennial symptoms. In conclusion, detection of underlying cause of airway diseases is an important step in managing the disease. In this study HDM and Parietaria were the most frequently determined allergens, both yielded perennial symptoms revealing the importance of continuous treatment through the year.
Keywords: Allergic rhinitis, Asthma, House dust mite, Parietaria, Respiratory allergies, Skin prick test

Özet: Alerjik havayolu hastalıklarının prevalansı tüm dünyada artmaktadır. Hastaların tedavilerini ve gereken önlemleri belirlemek için sorumlu alerjeni saptamak önemlidir. Bu çalışmada respiratuar alerji şüphesi olan hastaların demografik ve klinik özelliklerinin araştırılması amaçlanmıştır. İmmunoloji ve alerji hastalıkları polikliniğine başvurmuş erişkin hastaların tıbbi kayıtları retrospektif olarak incelendi. Burun akıntısı, burun kaşıntısı, hapşırma, burun tıkanıklığı, nefes darlığı göğüste sıkışma, balgam çıkarma, öksürük, göz kaşıntısı gibi semptom ve/veya yakınmalardan en az biri olan hastalar çalışmaya dahil edildi. Hastaların demografik ve klinik özellikleri kaydedildi. Atopi durumu deri prik testleri ve/veya serum spesifik IgE tayini ile yapıldı. Çalışmaya dahil edilen 986 hastanın çoğu (%73.32) kadındı. Hastaların %73.38'inde rinit, %14.4'ünde rinit ve astım, %3.54'ünde astım, % 11.66'sında nonspesifik havayolu semptomları bulunmaktaydı. 426 (%43.20) hasta atopikti, ev tozu akarı ve Parietaria en sık saptanan alerjenlerdi. Rinit ve astım hastalarının yaklaşık yarısında atopi mevcuttu. (sırasıyla %48.32, %51.9). Bir yabani ot poleni olan Parietaria'ya karşı aşırıduyarlılık tespit edilen hastalarda yakınmalar perennialdi. Sonuç olarak havayolu hastalığı altta yatan sebebini bulmak hastalık yönetimi için önemli bir basamaktır. Bu çalışmada evtozu akarı ve Parietaria en sık saptanan alerjenler olup, her ikisi de perennial yakınmalara sebep olmaktadır. Bu bulgu, tedavinin yıl boyu devam etmesinin önemini göstermektedir.
Anahtar Kelimeler: Alerjik rinit, Astım, Ev tozu akarı, Parietaria, Havayolu alerjileri, Deri prik test

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1. Introduction

Indoor and outdoor allergens are proteins that may induce IgE synthesis in sensitive patients. Sensitization to indoor and outdoor allergens together with exposure is a risk factor for allergic airway diseases such as asthma and allergic rhinitis(AR) (1).

Asthma is a chronic respiratory disease characterized by variable symptoms of wheezing, cough, shortness of breath, chest tightness with a marked heterogeneity in aetiology, pathophysiology and clinical aspects (2), based on clinical features and pathophysiological mechanisms different asthma subtypes have been identified. These subtypes of certain clusters with similar demographic, clinical and pathophysiological characteristics are called asthma phenotypes (3, 4).

Allergic asthma is most easily recognized asthma phenotype that may be associated with family history and concomitant other allergic diseases such as allergic rhinitis, atopic dermatitis, eczema food/drug allergies (2).

Rhinitis is defined as having at least one of the symptoms: rhinorrhea, nasal itching and nasal congestion. When rhinitis is induced by an immunoglobulin IgE-mediated inflammation of the nasal mucous membranes following allergen exposure it is defined as AR (5, 6).

The prevalence of allergic airway diseases are increasing worldwide, yielding a substantial socioeconomic loss and deterioration in the quality of life for patients. In order to reduce burden of allergic diseases, early disease diagnosis, taking precautions, and effective treatment are necessary (7, 8).

The primary aim of this study was to evaluate the demographic and clinical features of patients referred to outpatient clinic of immunology and allergy with complaints and/or symptoms of airway diseases. Secondary aim of was to determine the presence of atopy and clinical compatibility of sensitized allergens by means of symptomatology and seasonal pattern.

2. Materials and Methods

2.1 Study Design

Medical reports of adult patients who admitted to an outpatient clinic of Allergy and Immunology Department between January 2021–June 2022 were retrospectively screened. Patients those had at least one of the following complaints and/or symptoms such as rhinorhea, nasal itching, sneezing, nasal obstruction, shortness of breath, chest tightness, phlegm, cough, itchy eyes were recruited to study. Demographic and clinical features were reported.

Atopy was defined as at least 1 positive skin prick test (SPT) result or positive specific IgE (ssIgE) to common aeroallergens. A positive skin prick test was defined as a mean wheal diameter at least 3 mm larger than the negative control with surrounding erythema (9). SsIgE positivity was defined as a value of 0.35 kU/L or more (10). Polysensitization was defined if more than one allergen was present.

The visual analogue scale (VAS) were used to assess the severity of AR. VAS symptom scores ranged from “nasal symptoms, not at all bothersome” (0 cm) to “nasal symptoms, extremely bothersome” (10 cm). VAS below 5cm were defined as mild rhinitis and those equal to or above 5 cm defined as moderate/severe rhinitis. AR is also defined as seasonal and/or perennial according to distribution of symptoms throughout the year (5, 11).

The degree of asthma control was assessed with the Asthma Control Test (ACT). Having an ACT score of less than 20 was defined as uncontrolled asthma and asthma severity is assessed from the level of treatment required to control symptoms and exacerbations (2, 12).

Patients with any data lacking were not included to the study.

Ethical approval was obtained from the Seyrantepe Hamidiye Etfal Sağlık

Uygulamaları ve Araştırma Merkezi Ethics Committee (Date: 07/05/2022, No.3606).

2.2. Statistical analysis

Statistical analysis was performed by SPSS.25 version. Categorical variables were summarized as frequencies and percentages. Continuous variables were given as mean and standard deviations or median (IQR) according to the distribution of the data. The Wilcoxon test was used for comparison of data that were not normally distributed. Mann- Whitney U test and Kruskal-Wallis test was conducted to evaluate the different groups. In all analyses, p values less than <0.05 were considered as statistically significant.

3. Results

3.1. Clinical and demographic features of the patients

3009 patients were screened and 986 patients found eligible to the study. The ages of patients ranged from 18 to 82 years (mean: 36.74± 13.37 years) and 723(73.32%) patients were female. 694 (70.38 %) patients had rhinitis, 142 (14.40 %) had patients rhinitis and asthma, 35 (3.54 %) patients had asthma, 115 (11.66%) patients had nonspesific airway symptoms and were not diagnosed as neither asthma nor rhinits. Of the 115 patients, 50 patients had chronic cough without any concomitant allergic or occupational airway disease. Others had various complaints/ symptoms such as posterior rhinnorhea, phlegm, conjuctivitis, sore throat frequent pharyngitis.

Of the rhinitis patients, 404 (48.32 %) patients were atopic and were defined as AR patients as stated above. According to AR severity classification, 119 patients (29.45 %) had mild AR, while 285 patients (70.54 %) had moderate-severe AR. Symptoms were perennial in 358 (88.61 %) patients and 37 (9.15%) of them were having seasonal exacerbations, 46 (11.38 %) patients had only seasonal AR.

51.97% of asthmatic patients had positive allergy tests and they were defined as allergic asthma patients. According to severity of asthma 147(83.52%) patients had mild asthma, 20 (11.36%) patients had moderate asthma, 10 (5.68%) patients had severe asthma.

Childhood onset of symptoms were detected in 15.21 % of all patients.

3.2. Atopy status and distribution of allergen sensitization

Atopy was detected in 426 (43.29 %) patients, house dust mite (HDM) was the most frequent allergen (33.87 %), while pollen hypersensitivity was detected in 14.80 %, mold in 5.37% and animal dander in 2.83 % of the patients. Having a positive SPT/ssIgE with 2 or more allergens is defined as polysensitization. 134 (13.59 %) patients were polysentisized, making 31.45 % of the atopic patients.

The distribution of aeroallergen hypersensitivity in atopic patients were shown in Table1.

Table 1. The distribution of aeroallergen hypersensitivity in atopic patients.

	Name of Allergen	Number of patients (%)
House dust mite allergens	Dermatophagoides Pteronyssinus	331 (33.6)
	Dermatophagoides Farinae	321 (32.6)
Pollen allergens	Grass	57 (5.8)
	Grass-cereal	27 (2.7)
	Tree pollens	39(4)
	Wall pelitory	68 (6.9)
Mold allergens	Alternaria Alternata	44 (4.5)
	Aspergillus Fumigatus	36 (3.7)
Animal dander allergens	Cat	25 (2.5)
	Dog	10 (1)

Atopy didn't differ between genders. Atopic patients were significantly younger than nonatopic patients. The age group with the highest allergen positivity was between 18 to 40 years old group.

When atopy was evaluated according to initial diagnosis it was observed that patient with nonspesific airway symptoms were nonatopic (p <0.001) and atopy was more frequently observed in patients those are initially diagnosed as asthma and rhinitis together (p=0.024).

The comparison of clinical and demographic characteristics of atopic and non atopic patients were shown in Table 2.

Table 2. The comparison of clinical and demographic characteristics of atopic and non-atopic patients

		Atopic patients, n (%)	**Nonatopic patients, n (%)**	**p**
Gender	Male	123 (46.8)	140 (53.2)	NS
	Female	300 (41.5)	423 (58.5)	
Childhood onset		89 (59.3)	61 (40.7)	<0.001
Age, mean		32.96±11.22	39.58 ±14.1	<0.001
Age groups	18-40 years	322 (52.1)	296 (47.9)	NS
	40-60 years	89 (29.5)	213 (70.5)	<0.001
	60 < years	12 (18.2)	54 (81.8)	<0.001
Initial diagnosis	Rhinitis	320 (41.6)	374 (53.9)	NS
	Asthma	11 (31.4)	24 (68.6)	NS
	Rhinitis+ asthma	82 (57.7)	60 (42.3)	0.02
	None	10 (8.7)	105 (91.3)	<0.001
Asthma	Mild	72 (49)	75 (51)	NS
	Moderate-Severe	20 (66.3)	10 (33.3)	

Polisensitization can effect distribution of symptoms' seasons, particularly in favour of perennial pattern. To eliminate this contoversy, seasonal patterns of symptoms according to sensitized allergens are evaluated in monosensitized patients. This evaluation demonstrated that patients with DHM, mold, wall-pellitory (Parietaria) and cat/dog hypersensitivity had perennial symptoms, while Patients with grass, and tree pollen hypersensitivity had seasonal symptoms (table 3).

Table 3. Distribution of seasonal pattern of symptoms in monosensitized patients

	Seasonal symptoms, n of patients	**Perennial symptoms, n of patients**	**p**
House dust mite	1	222	<0.001
Parietaria	8	20	<0.001
Grass Pollen	8	2	<0.001
Tree Pollen	6	3	<0.001
Mold	0	19	
Animal dander	0	9	

The frequency of HDM hypersensitivity in asthma and rhinitis were 44.63 % and 38.15% respectively (p= 0.001, <0.001 respectively). When HDM hypersensitivity is assesed in allergic asthma and allergic rhinitis, frequency of HDM hypersensitivity are 81.05 % and 78.21 % respectively (p= <0.001, p=<0.001 respectively).

4. Discussion

Respiratory allergic diseases yields an important burden for patients by means of socioeconomic loss and reduction in the quality of life. Identifying the allergen responsible for the disease is important to take precautions and managing these diseases accordingly. In our study, more than a half of the patients had a disease in allergic nature and/or deteriorated by environmental exposures. Atopy was detected in 43.20 % of patients, and the frequency of atopy is higher in patients initially diagnosed as asthma and rhinitis together (p=0.024). The strong correlation between allergic asthma and allergic rhinitis as comorbidities is often interpreted as an evidence for underlying sensitization, which in turn comprimises the term respiratory allergic disease (2, 13).

The most common allergen was HDM (33.87%). European Community Respiratory Health Survey (14) detected an overall prevalence of 21 % sensitization to HDM, which is a lower prevalance compared to this study. The higher prevalance in this study can be explained by the increased prevalance of HMD hypersensitivity in warm an humid climates.

Parietaria is the second most frequent allergen detected in this study, which is considerable since Parietaria is one of the most important causes of pollen allergies in Mediterranean region. Parietaria has a peculiar value, in particular for its long lasting duration of pollination, even some doctors accept it as a perennial allergen (15, 16). Ariano R et al. demonstrated that the Parietaria season has tended to be prolonged, and its pollen count has tended to increase over time (17). In a 10 year lasting study conducted in Italy, Parietaria polination was found to be 6-7 months on average, with two main peaks seen: an important peak during mid-spring and a lower peak during early fall (18). Due to long lasting pollination, the impact of Parietaria on clinical symptoms for sensitive patients may last longer that symptoms may not be named as seasonal. In this study, when seasonal patterns of symptoms are evaluated for Parietaria sensitive patients, it is found that perennial pattern is significantly more frequent than seasonal pattern.

Animal dander hypersensitivity were the least frequent allergens in this study. This low frequency might be attributed to the fact that SPT or ssIgE for cat and dog wasn't routinely performed unless a patient had any complaints and/or exposure suggesting pet allergy. Nevertheless the frequency of pet allergy in Turkey is lower when compaired to European countries and the US which might be explained by low pet ownership rate in our country (19, 20).

Age was an important discriminating factor for atopy (2). In this study, atopic patients were significantly younger than nonatopic patients. It was observed that allergen positivity decreased with increasing age. Although very low in frequency atopy can be detected also in geriatric patients.

31.59 % of the atopic patients were polysensitized. Cross reactions between allergens may cause false positivity yielding false identification of polysensitization. Component resolved diagnosis (CRD) allows a detailed molecular profiling of the polyclonal IgE repertoire of the allergic patient thus are useful in discriminating polysensitization (21). Since CRD wasn't performed in this study, there may be false polysensitizations. This is a potential limitation of this study.

5. Conclusion

Present study investigated allergen sensitivity of patients with symptoms suggesting respiratory allergy. Patients having nonspesific symptoms without an initial diagnosis of rhinitis or asthma tend to be nonatopic. HDM is the most frequently detected allergen and symptoms are mainly perennial. This finding reveals the importance of continuos treatment throughout

the year in order to control symptoms and reduce inflammation.

Secondly, Parietaria sensitive patients had perennial distribution of symptoms. In light of this finding Parietaria can be considered as a perennial allergen, but further studies with larger series are needed to clarify seasonal pattern of Parietaria.

REFERENCES

1. Kanchongkittiphon W, Mendell MJ, Gaffin JM, Wang G, Phipatanakul W. Indoor environmental exposures and exacerbation of asthma: an update to the 2000 review by the Institute of Medicine. Environmental health perspectives. 2015;123(1):6-20.
2. Global Iniative for Asthma. Global Strategy for Asthma Management and Prevention, 2022. Accessed August 8, 2023.-. 2022.
3. Wenzel SE. Asthma: defining of the persistent adult phenotypes. The Lancet. 2006;368(9537):804-13.
4. Moore WC, Meyers DA, Wenzel SE, Teague WG, Li H, Li X, et al. Identification of asthma phenotypes using cluster analysis in the Severe Asthma Research Program. American journal of respiratory and critical care medicine. 2010;181(4):315-23.
5. Bousquet J, Van Cauwenberge P, Khaltaev N. Allergic rhinitis and its impact on asthma. Journal of allergy and clinical immunology. 2001;108(5):S147-S334.
6. Greiner AN, Hellings PW, Rotiroti G, Scadding GK. Allergic rhinitis. The Lancet. 2011;378(9809):2112-22.
7. Pawankar R. Allergic diseases and asthma: a global public health concern and a call to action. BioMed Central; 2014. p. 1-3.
8. Simoens S, Laekeman G. Pharmacotherapy of allergic rhinitis: a pharmaco-economic approach. Allergy. 2009;64(1):85-95.
9. Heinzerling L, Mari A, Bergmann KC, Bresciani M, Burbach G, Darsow U, et al. The skin prick test - European standards. Clin Transl Allergy. 2013;3(1):3.
10. Siles RI, Hsieh FH. Allergy blood testing: A practical guide for clinicians. Cleve Clin J Med. 2011;78(9):585-92.
11. Bousquet P, Combescure C, Neukirch F, Klossek J, Mechin H, Daures JP, et al. Visual analog scales can assess the severity of rhinitis graded according to ARIA guidelines. Allergy. 2007;62(4):367-72.
12. Nathan RA, Sorkness CA, Kosinski M, Schatz M, Li JT, Marcus P, et al. Development of the asthma control test: a survey for assessing asthma control. Journal of Allergy and Clinical Immunology. 2004;113(1):59-65.
13. Shaaban R, Zureik M, Soussan D, Neukirch C, Heinrich J, Sunyer J, et al. Rhinitis and onset of asthma: a longitudinal population-based study. The Lancet. 2008;372(9643):1049-57.
14. Sunyer J, Jarvis D, Pekkanen J, Chinn S, Janson C, Leynaert B, et al. Geographic variations in the effect of atopy on asthma in the European Community Respiratory Health Study. Journal of Allergy and Clinical Immunology. 2004;114(5):1033-9.
15. Ciprandi G, Puccinelli P, Incorvaia C, Masieri S. Parietaria allergy: An intriguing challenge for the allergist. Medicina. 2018;54(6):106.
16. Sala-Cunill A, Bartra J, Dalmau G, Tella R, Botey E, Raga E, et al. Prevalence of asthma and severity of allergic rhinitis comparing 2 perennial allergens: house dust mites and Parietaria judaica pollen. J Investig Allergol Clin Immunol. 2013;23(3):145-51.
17. Ariano R, Canonica GW, Passalacqua G. Possible role of climate changes in variations in pollen seasons and allergic sensitizations during 27 years. Annals of Allergy, Asthma & Immunology. 2010;104(3):215-22.
18. Alessandria A, Gabriella MM, Oliviero Q, Emiliani F, Mario O, Niccolis M, et al. Parietaria pollination duration: myth or fact? Eur Ann Allergy Clin Immunol. 2017;49(1):6-10.
19. Yüksel Aslıer NG, Saatçi Ö, Aslier M. Disease and Quality of Life Aspects of Cat Allergy in Non-Pet Owners with Allergic Rhinitis. International Archives of Allergy and Immunology. 2023;184(7):625-33.
20. Dávila I, Domínguez-Ortega J, Navarro-Pulido A, Alonso A, Antolin-Amerigo D, González-Mancebo E, et al. Consensus document on dog and cat allergy. Allergy. 2018;73(6):1206-22.
21. Dramburg S, Hilger C, Santos AF, de Las Vecillas L, Aalberse RC, Acevedo N, et al. EAACI Molecular Allergology User's Guide 2.0. Pediatric Allergy and Immunology. 2023;34:e13854.

Ethics

Ethics Ethics Committee Approval: The study was approved by Hamidiye Etfal Research Hospital Ethical Committee (Approval Date/ Number: 05.07.2022/3606)
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