Results of Allergic Prick Tests in Patients with Allergic Rhinitis in Edirne

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Abstract

Objective: This study aimed to determine the allergen distribution by sex and age in patients diagnosed with allergic rhinitis living in Edirne and to evaluate the patients presenting with allergic rhinitis symptoms considering climatic and geographic factors.

Material and Methods: Between March 2013 and March 2018, in an Otorhinolaryngology clinic in Edirne, a total of 334 (226 female, 108 male) patients with allergic rhinitis diagnosis underwent an allergic skin test (prick test). The data were evaluated on the basis of age, sex, and sensitive allergen.

Results: A total of 226 female (66.7%) and 108 male (33.3%) patients were included in the study. The mean age of the participants was 27±18.1 years. In 326 patients (97.6%), a reaction to at least 1 allergen was detected. A total of 130 patients (38.9%) with the most common allergy were seen against *Dermatophagoides farinae* from the house dust allergen group. The second most common allergen susceptibility was detected from the weed pollen allergen group in a total of 107 individuals (32%). The first and second most common allergens (*D. farinae* and *Plantago lanceolata*) were found to be similar in males and females.

Conclusion: A high rate of positivity was detected in patients diagnosed with allergic rhinitis. In accordance with regional characteristics, the second allergen was determined as P. lanceolata. Determining the differences in regional allergen sensitivity in patients with allergic rhinitis may contribute to preventive measures.

Keywords: Allergens, allergic rhinitis, skin tests

INTRODUCTION

Allergic rhinitis (AR) presents with a symptom complex characterized by sneezing, runny nose, nasal congestion, and itching of the eyes, nose, and palate. In addition, these symptoms may be accompanied by postnasal discharge, coughing, irritability, and fatigue (1, 2). Patients with AR respond to allergen exposure by producing allergen-specific immunoglobulin E (IgE). IgE antibodies bind to IgE receptors on mast cells along the respiratory mucosa and to basophils in peripheral blood. When the same allergen is subsequently inhaled, the allergen cross links to IgE on the mast cell surface, resulting in the activation and release of inflammatory mediators (3). AR is a common disease affecting 10-30% of children and adults (4, 5). The prevalence of doctor-diagnosed AR in different centers in Turkey was reported to be 11.8-36.4% (6). It has been shown that the prevalence increases, especially in urban and industrialized areas (5, 7). There are studies showing that climatic factors, such as high humidity, temperature, and geographical characteristics, affect the type and frequency of allergens exposed to in our country (8, 9).

The increase in the prevalence of AR is the result of a combination of environmental factors, such as western lifestyle, and genetic predisposition. Family history of atopy, male sex, the delivery time during pollen season, early antibiotic use, maternal smoking during the first year of life, exposure to indoor allergens, serum IgE >100 IU/mL before 6 years of age, and the presence of allergen-specific IgE are some of the risk factors of AR (10). Determining the allergen in patients with AR is very important in terms of prevention and immunotherapy. Allergens are identified by *in vivo* skin tests or in vitro (serological) tests. In vitro tests include total IgE measurement, histamine release test, and allergen-specific IgE measurement (11). Rapid hypersensitivity skin testing (prick skin tests) is a quick and cost-effective way to identify the presence of allergen-specific IgE. In addition, the skin prick test has a very high negative predictive value in certain allergens (e.g., inhalants and foods), and the skin test can exclude allergy with relative precision (12, 13). Identifying possible allergens that cause AR is very critical in terms of accelerating the treatment process and contributing to a person's quality of life. In our country, some studies have been carried out on allergens that cause regional AR (5, 6, 8, 9). In the literature, no study was found to detect possible allergens in AR cases in our region using reliable methods.

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This study aimed to determine the distribution of allergens according to sex and age in patients living with AR in the Edirne region and to evaluate the patients presenting with AR symptoms by considering the climatic and geographical factors.

MATERIAL AND METHODS

This retrospective study was approved by the Scientific Research Ethics Committee of Trakya School of Medicine (Protocol Code: TUTF-BAEK2019/188) dated 22/04/2019. An informed consent was obtained from all subjects. During the study, the principles of the Guidelines on Good Clinical Practices and the Helsinki Declaration were followed.

Allergic skin test (prick test) results of 334 (226 female, 108 male) patients diagnosed with AR between March 2013 and March 2018 in the otorhinolaryngology clinic in Edirne were evaluated. Patients who had a history of drug use, such as the use of antihistamines, corticosteroids, anti-inflammatory medications, and immunosuppressive medications, which would impair active infection, active allergic skin disease, pregnancy, or skin tests, were not included in the study.

A total of 24 allergen extracts were used for the test. Before the test, the forearm area was wiped without spraying with alcohol. A total of 24 points were marked on the inside of the forearm, facing each other in 2 rows with an average distance of 2 cm from each other. Physiological serum (negative control) was added to the first mark, and histamine (positive control) was added to the second mark. Other allergens were instilled as 1 drop, respectively. The surface of the skin was removed with the prick test applicator by passing through the dropped allergen, and care was taken not to bleed the skin. For each allergen, a separate prick test applicator was used to prevent cross contamination and was allowed to stand for 20 minutes for evaluation. The presence of induration and the diameter of the induration were evaluated. The reactions were graded as 0 for no reactions, 1+ and 2+ for moderate reactions, and 3+ and 4+ for severe reactions (Table 1).

Allergen extracts used in the tests were (1) histamine (positive control), (2) physiological serum (negative control), (3) Alternaria alternata, (4) *Cladiosporium*, (5) cat's hair, (6) dog's hair, (7) feather mixture, (8) *Dermatophagoides farinae*, (9) *D. Pteronyssinus*, (10) Rye, (11) grain, 12) Birch family, (13) willows, (14) herb mixture, (15) chamomile, (16) *Plantago lanceolata*, (17) wormwood grass, (18) stinging nettle, (19) eggs, (20) strawberries, (21) tomatoes, (22) cow's milk, (23) sheep's milk, and (24) peanut. The extracts were obtained from the same brand throughout the study. All procedures during the application and evaluation of the test were conducted by the author of this study.

The data were analyzed with Statistical Package for the Social Sciences (SPSS) program version 23.0 (IBM SPSS Corp.; Armonk, NY, USA). Continuous data were expressed as Mean ± SD, and categorical data were presented as frequency and percentages. The chi-square test was used to compare the categorical data and $p<.05$ was considered statistically significant.

RESULTS

Of the 334 patients with AR, 226 (66.7%) were female, and 108 (33.3%) were male. The mean age of the female participants was 31.2±17.8 years, and the mean age of male participants was 27.2±18.3 years. There were 32 pediatric patients (9.58%), of whom 21 (65.6%) were female, and 11 (34.4%) were male. The mean age of the female pediatric participants was 11.2±3.9 years, and the mean age of the male pediatric participants was 15.3±4.2 years. The youngest of the participants was aged 4 years, and the oldest was aged 78 years. No scientifically significant difference was found between the adult and the pediatric groups in terms of allergen groups and positivity rates (p=.873).

Table 1. Grading of the skin test

Grade	Skin Appearance
0	No reaction
1	Erythema ≤5 mm; no edema
2	Erythema >5 mm; edema <3 mm
3	Edema 3-6 mm
4	Edema >6 mm and pseudopod development

Table 2. The distribution of the most common allergen susceptibilities of the participants according to sex

	Prick Test Positive Patients		*p* (difference between males and females)
	Female (n=226)	Male (n=108)	
D. farinae	87 (38.5%)	43 (39.8%)	0.811
Plantago lanceolata	71 (31.4%)	36 (33.3%)	0.802
Stinging nettle	69 (30.5%)	33 (32.4%)	0.996
Rye	67 (29.6%)	35 (32.4%)	0.699
All allergens	219 (96.9%)	107 (99.1%)	0.445

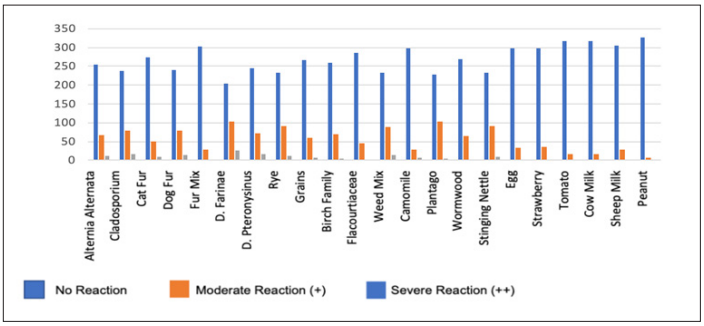

Figure 1. Allergens used in the skin prick test and the distribution of patients developing positive reactions to these allergens

Sensitivity to at least 1 allergen was detected in a total of 326 participants (97.6%), of which 219 (96.9%) were female patients, and 107 (99.1%) were male patients (Table 2).

Whereas 21 of the patients (6.44%) with positive prick test had a sensitivity to only 1 allergen, 305 (93.5%) had a sensitivity to multiple allergens. The allergens used in the skin prick test and the distributions of participants that developed a positive reaction to these allergens are shown in Figure 1.

In In total, in 87 of the female participants (38.5%) and 43 of the male participants (39.8%), the most common allergy was against *D. Farinae*, a household dust allergen group, with a total of 130 people (38.9%). The second most common allergen was in 71 of the females (31.4%) and 36 of the males (33.3%), and 107 of the weed pollen (32.0%) were identified as *P. lanceolata* from the allergen group. The distribution of the detected allergens in male and female participants is shown in Figures 2 and 3.

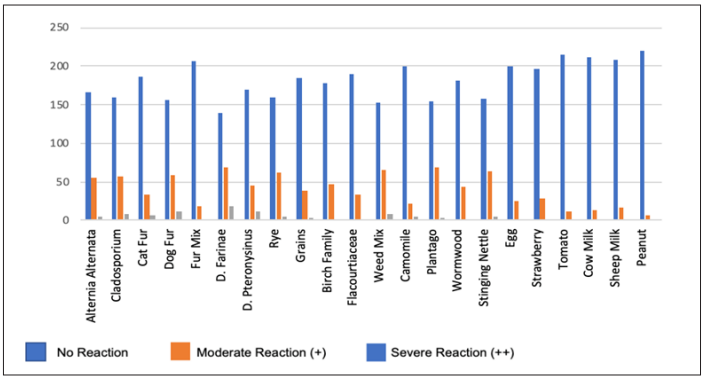

Figure 2. Distribution of allergens detected in the female participants

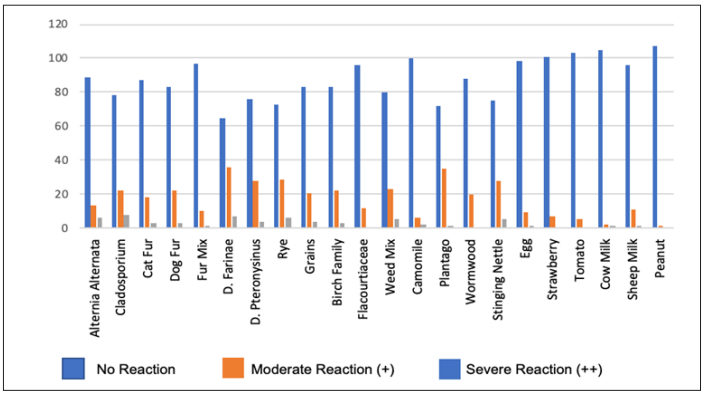

Figure 3. Distribution of allergens detected in the male participants

DISCUSSION

In our study, the most common allergen was found to be house dust mites, in parallel with the literature (14, 15). There were no differences between the pediatric and the adult participants. When international studies on the subject are evaluated, it can be seen that indoor allergens, such as house dust mites, play a higher role in the pathogenesis of respiratory allergic diseases, such as asthma and AR, than other allergens (13, 14). Considering that house dust mites are independent of environmental factors, it is predictable that they are seen as the most common allergens in the literature. However, there may be differences in the dominant allergen group depending on the climatic characteristics, hygiene habits, and pet ownership of the studied area (16, 17). We aimed to determine the impacts of climatic and geographical factors on the distribution of allergens in patients with AR and to determine the preventive measures in patients. In addition, this study will contribute to the literature because it is a study with wide participation conducted in the Edirne region and shows results arising from geographical differences.

Sensitivity to at least 1 allergen was found in 97.6% of the patients. When the international literature is examined, it can be seen that the prick test for seasonal AR shows a positivity between 90% and 97% (18, 19). When studies conducted with similar patient groups to our country were evaluated, skin prick test positivity was found to be 75% in patients with AR in Şanlıurfa, 56.7% in those in Düzce, 56.5% in those in Ankara, 31.2% in those in Malatya, and 70.8% in patients with allergic respiratory disease in Osmaniye, 64.7% in those in Yozgat, 61.6% in those in Isparta, 60% in those in Kayseri, and 59.7% in those in Edirne (8, 20-29).

In this study, 97.6% of the patients who underwent the prick test were positive for at least 1 allergen. The reasons for the difference between the studies can be considered as careful patient diagnoses before the test, informing the patient about avoiding the factors that will affect the test, and conducting the tests during periods of allergy.

We found that the second most common allergen was *P. lanceolata* from weed pollens instead of from tree pollen. In a similar study performed by Aydemir et al. (21) in the Sakarya province, the second most common allergen susceptibility was found to be against olives and hazelnut tree pollens (41.1%). The most common agent in their study was also in the house dust mite group, but it was *D. Pteronyssinus* (43.1%). *D. farinae* was the third most common allergen (39.1%) in the Sakarya province. Ayvaz et al. (30) showed sensitivity rates of 70% and 61% for grass pollen and house mites, respectively, in the Eastern Black Sea Region. The difference between their study and our study with respect to the most common allergen might be due to the prick test kit they used, which gathers over 15 types of grass extract under a single group. Tezcan et al. (31) showed that grass pollen was the most common cause of sensitivity in İzmir. Similarly, in a study conducted in Şanlıurfa, grass pollen was the most common cause of sensitivity (67%) in patients with AR. (28) The explanation of the differences in the most common allergen between our study and those of others is similar to the explanation of the differences found between our study and that of Ayvaz et al. (30). To avoid overestimating the positive reaction to any group, a more detailed extract kit could be used. However, it would be quite unrealistic to assume that any given environment would have isolated allergens such as a field of wormwood grass or stinging nettle without any other grass-type allergens. The grouping of similar allergens could cut the costs when it is done effectively.

This difference stems from the differences in the geographical and climatic structures of the region. When the studies in the literature were evaluated carefully, the type and number of pollens in the outdoor environment (region, temperature, and climate) were found to affect AR. (32)

Allergic diseases are known to change with age, sex, race, and genetic factors (10). The rate of sensitivity to at least 1 allergen was 96.9% in female patients and 99.1% in male patients. The first and second most common allergens (*D. farinae* and *P. lanceolata*) were found to be similar in female and male patients.

The fact that this study is one of the first studies performed in our region, that all the procedures were performed by a physician, and that the procedure was carried out very carefully before the allergy test can be considered as strengths of this study. The lack of a control group of healthy volunteers and the exclusion of patients with other atopic diseases other than AR could be considered as limitations of this study.

This study is important in terms of providing information about the allergen characteristics of patients with AR in the Edirne province owing to the high number of participants among the studies conducted throughout the region. During the period of this study, the total number of patients consulting the otolaryngology clinic was 48,325, among whom 4,645 (9.61%) were diagnosed with AR. Only 334 of those patients (7.19%) had an allergic prick test performed. Even though AR is not the primary cause of otolaryngology clinic visits, a rate of almost 10% of the total patients is a considerable amount.

CONCLUSION

A high rate of allergen positivity was detected, and when we look at the list of the most common allergens, it was found that *P. lanceolata* came second in line with the regional characteristics. In addition, the first and

second most common susceptible antigen rates were similar in female and male patients. The determination of differences in regional allergen sensitivity in patients with AR will help improve preventive measures. A reduction in the loss of labor caused by this disease will reduce the economic loss caused by school failure and other diseases such as sinusitis and asthma. It is recommended to verify the allergens through more extensive and community-based studies and that regional measures should be reviewed.

Ethics Committee Approval: Ethical committee approval was received from the Scientific Research Ethics Committee of Trakya School of Medicine (Protocol Code: TUTF-BAEK2019/188, Date: 22/04/2019).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer-review: Externally peer-reviewed.

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