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Evaluation of Skin Prick Test Results in Erzurum Region

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ABSTRACT

The skin prick test (SPT) is frequently used to detect allergen sensitivity in disorders such as atopic dermatitis, chronic urticaria, allergic rhinoconjunctivitis, and asthma. The study evaluated allergen sensitivity with SPT in the Erzurum region.
Patients who underwent SPT diagnosed with atopic dermatitis, chronic urticaria, angioedema, idiopathic generalized pruritus, allergic rhinitis, and allergic conjunctivitis were prospectively included in our study. House dust mites, animal hairs, fungi, pollen, and cockroach epithelium were applied as aeroallergens. Chicken, fish, mutton, beef, milk, egg yolk, egg white, banana, kiwi, strawberry, peach, tomato, peanut, hazelnut, walnut, cocoa, and cereals were applied as food allergens.
The study included 110 patients. At least one allergen was positive in 58 (52.7%) patients. At least one of the aeroallergens was positive in 53 patients (48.2%), and the most common aeroallergen was house dust mites (26.4%). In 17 patients (15.5%), at least one of the food allergens was positive, and the most common food allergen was banana (8.2%). There was no statistically significant difference in allergen positivity between patients with atopic dermatitis (17/27), chronic urticaria (13/25), angioedema (3/7), pruritus (16/34), and allergic rhinitis (16/30). However, in patients with allergic conjunctivitis (2/11), the rate of allergen positivity was found to be significantly lower ($p<0.01$).
We detected the most common house dust sensitivity in patients with atopic dermatitis and chronic urticaria, and pollen sensitivity in patients with pruritus and allergic rhinitis. Studies involving more patients with angioedema and allergic conjunctivitis are needed.

Keywords: Allergic rhinitis, angioedema, atopic dermatitis, skin test, urticaria

Introduction

In recent years, allergic disorders have increased, particularly in developed countries. The more use of food additives, greater exposure to industrial chemicals, and an increase in diagnoses of these disorders as a result of better recognition are the main causes of this rise (1). The frequency of allergic diseases varies by region (2).

The skin prick test (SPT) is an essential diagnostic tool that reveals the existence of allergen-specific immunoglobulin E (IgE) for proteins and peptides in allergic diseases. SPT is used in conditions including atopic dermatitis, chronic urticaria, allergic rhino-conjunctivitis, asthma, anaphylaxis, and medication or food allergies (3). Mites, grass and tree pollen, animal dander, fungal spores, insect epithelium, and food allergens are generally applied in SPT (4). There are also regional differences in test positivity due to changing factors such as individual differences, climate, altitude, vegetation, and lifestyle (5,6).

This study aims to prospectively evaluate allergen positivity with SPT in patients with allergic complaints in the Erzurum region.

Material and Methods

Patients who applied to the Dermatology and Otorhinolaryngology outpatient clinics between August 2020 and April 2021 with atopic dermatitis, chronic urticaria, angioedema, idiopathic generalized pruritus, allergic rhinitis, and allergic conjunctivitis were planned to be included in the study. The study was initiated with the approval of the Erzurum Regional Training and Research Hospital Local Ethics Committee (decision no: 2021/01-13). The principles of the Declaration of Helsinki conducted the study. Sociodemographic data, anamnesis, and prick test results of the patients were recorded. The study included 110 patients aged between five and 70 years. Patients who took antihistamines, corticosteroids, mast cell stabilizers, anti-inflammatories, decongestants, or

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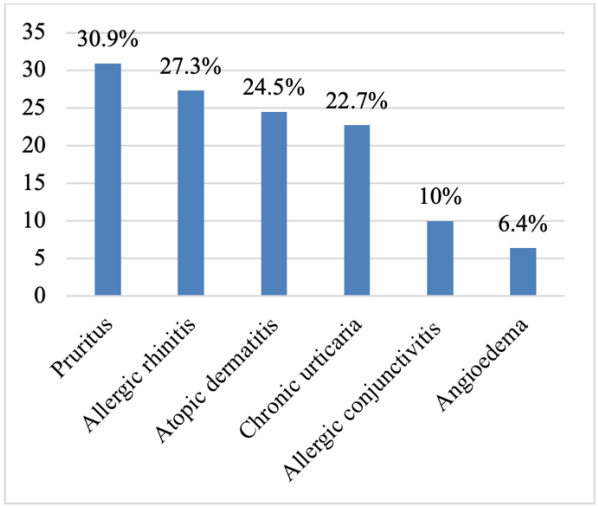

Fig. 1. Diagnosis of patients who underwent SPT

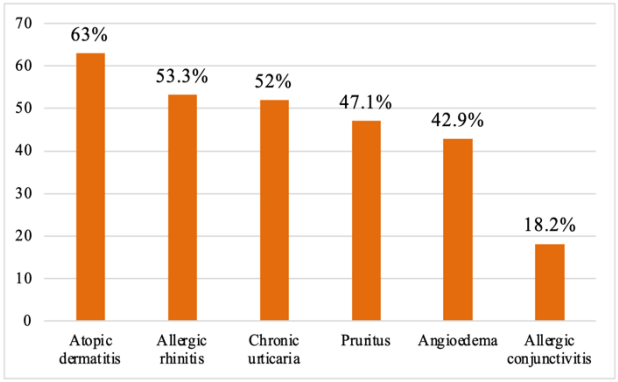

Fig. 2. SPT positivity rates by diagnosis

immunosuppressive medications within 15 days of the prick test were excluded from the study.

As an aeroallergen, house dust mites (Dermatophagoides (D.) farinae), D. pteronyssinus), animal hairs (cat, dog, and bird feathers), fungi (aspergillus, cladosporium), pollen (grass mix, weed mix, olive branch) and cockroach epithelium were applied. Chicken, fish, mutton, beef, milk, egg yolk, egg white, banana, kiwi, strawberry, peach, tomato, peanut, hazelnut, walnut, cocoa, and cereal were used as food allergens.

SPT was applied according to European standards (4,5). Allergens of standard concentration and activity were applied to the volar aspect of the forearm at 2-3 cm intervals, and puncture was performed with the epidermal SPT applicator. Positive control with 1% histamine and negative control with the isotonic sodium chloride solution was applied to the right arm. After waiting for 20 minutes, the wheal diameters were evaluated. Wheal diameters >3 mm were considered positive. The SPT of the patients who were found to be sensitive to at least one allergen was evaluated as positive. The patients with a negative control positivity were considered as dermographism.

Statistical Analysis: SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL) package were used to analyze the analyses. Descriptive data were presented in the study as n, % values in categorical data and mean, standard deviation, median, and interquartile range (25-75 percentile values) in continuous data. The Chi-square approach was performed to compare categorical data. Kolmogorov-Smirnov analysis was used to determine the normality of the metric data. The Mann-Whitney U test was used to compare the two groups' measurement variables. In the analysis, the statistical significance threshold was set at $p<0.05$.

Results

A total of 110 patients, 76 male (69.1%) and 34 female (30.9%), with a mean age of 30.2±15.3 years, were included in the study. SPT was performed on the patients who were diagnosed with idiopathic generalized pruritus (30.9%), allergic rhinitis (27.3%), atopic dermatitis (24.5%), chronic urticaria (24.5%), conjunctivitis (10%), and angioedema (% 6,4) (Figure 1). There was a family history of atopy in 23% of the patients, and the median disease duration was 12 months (3-60 months). Other sociodemographic data are shown in Table 1.

At least one allergen positivity was detected in 58 (52.7%) patients. At least one of the aeroallergens was positive in 53 patients (48.2%). At least one of the food allergens was positive in 17 patients (15.5%). The positivity rates of allergens are shown in Table 2. Bird feathers from inhaler allergens and mutton, beef, cow's milk, cocoa, hazelnut, walnut, peach, and tomato from food allergens were not positive in any of the patients.

The highest rate of allergen positivity was detected in patients with atopic dermatitis (63%). When patients with positive SPT were compared according to their diagnoses, there was no statistically significant difference in allergen positivity in patients with atopic dermatitis (63%), chronic urticaria (52%), angioedema (42.9%), pruritus (47.1%) and allergic rhinitis (53.3%). Allergen positivity was found to be significantly lower in allergic conjunctivitis (18.2%) patients ($p<0.01$, Figure 2). It was observed that allergen positivity did not have a significant relationship with age, gender, disease duration, previous

Table 1: Sociodemographic Characteristics of the Patients

Age, Mean±SD		30.2±15.3
		Number (%)
Gender	Female	76 (69.1%)
	Male	34 (30.9%)
Educational status	Primary school	27 (24.5%)
	Middle school	25 (22.7%)
	High school	23 (20.9%)
	University	35 (31.8%)
Marital status	Single	57 (51.8%)
	Married	53 (48.2%)
Allergic disease history	Yes	15 (16.5%)
	None	95 (83.5%)
Family history (Allergic condition)	Yes	23 (20.9%)
	None	87 (79.1%)
Disease duration, Median (IQR)		12 months (3-60 months)

history of allergic disease, and family history (Table 3).

Nine patients (seven females and two males), five of whom had chronic urticaria, were found to have dermographism. There was no significant correlation between demographic features, previous history of allergic disease, and dermographism ($p>0.05$ for each).

Discussion

The frequency of allergic diseases and allergen sensitivity varies according to countries and regions. In our study, allergic diseases other than asthma are evaluated for the first time in terms of allergen positivity in the Erzurum region. In these patients, we found that the allergen positivity with SPT was 52.7%, and the most positive allergen was house dust mites (26.4%). In the study conducted by Barin et al., the allergen positivity was 45%, and the most frequently positive allergen was pollen (26%) in patients with asthma in this region (7). In studies conducted in different regions, the most frequently positive allergens vary as house dust (2, 5, 8, 9) and pollen (6, 10, 11).

Atopic dermatitis is an inflammatory chronic dermatosis characterized by recurrent itching episodes and eczematous lesions. In these patients, the frequency of allergic rhinoconjunctivitis, asthma, and positivity of aeroallergens or food allergens has increased (12). Atopic dermatitis is often the first step in the atopic march leading to the development of asthma or allergic rhinitis (13). When studies from our country on SPT positivity in patients with atopic dermatitis were evaluated, Kutlu and Metin found positivity in 65% of patients in the Kayseri region, and grass was the most common allergen (14). In a study involving different centers from our country, positivity was detected in 47% of patients, but allergens were not mentioned (15). In

Table 2: Positive Rates of Allergens

Aeroallergens	Positivity rate (%)	Food allergens	Positivity rate (%)
D. farinae	26.4	Banana	8.2
D. pteronyssinus	20.0	Chicken	7.3
Grass mix	19.1	Fish	1.8
Olive branch	14.5	Egg yolk	0.9
Weed mix	10.9	Egg whites	0.9
Cockroach	5.5	Cereals	0.9
Cladosporium	2.7	Peanut	0.9
Aspergillus	0.9	Kiwi	0.9
Dog fur	1.8	Strawberry	0.9
Cat fur	0.9	Peach	0
Bird epithelium	0	Tomatoes	0
		Mutton	0
		Veal	0
		Cow milk	0
		Cocoa	0
		Hazelnut	0
		Walnut	0

our region, SPT positivity was 63% in patients with atopic dermatitis; the most common allergen was house dust mites. Similar to our study, Oğuz et al. found the most frequently positive allergen to be mites in patients with atopic dermatitis in the Giresun region, and they found the positivity rate to be lower (47%) (9).

Urticarial plaques characterized by itching, erythema, and edema lasting longer than six weeks are considered chronic urticaria. Physical triggers, aeroallergens, food allergens, drugs, infections, systemic diseases, and stress may play a role in the etiology, but the cause is often undetected (16). A study investigating SPT positivity in patients with chronic urticaria detected 55% aeroallergen (43.7% house dust mite) and 5% food allergen sensitivity (17). Our study found SPT positivity in 52%, aeroallergen positivity in 48%, and food allergen positivity in 24% of chronic urticaria patients. Consistent with other studies, the most common allergen was house dust mites (2, 8, 9, 17, 18). In a study comparing chronic urticaria patients (32%) with healthy controls (26%) in terms of SPT positivity, no significant difference was found between the two groups (18).

There are many studies in the literature on allergen sensitivity in urticaria patients, and there are a high number of patients. The number of studies involving angioedema patients is very few, and the number of patients is low due to the rarity of the disease (9, 19). In our study, the lowest percent of patients were in the angioedema group (6.4%). In these patients, only pollen allergens were positive (42.8%) in SPT. In a study conducted with patients with hereditary angioedema, SPT positivity was found to be 29%, and the most common allergen sensitivity was reported to grass and tree pollen, as in the urticaria patients in our study (19).

In our study, idiopathic generalized pruritus was the most common SPT indication among all patients (30.9%). Patients with no lesions and chronic pruritus of unknown etiology were combined in this diagnosis, and SPT was performed. Goon et al. used idiopathic generalized pruritus when the patient complains of widespread pruritus without any signs of cutaneous or systemic disease that may cause inflammation or pruritus (20). In a study involving patients with chronic pruritus, it was reported that the most common allergen was house dust mites (9). In our study, the rate of SPT positivity in patients with pruritus was found to be 47.1%, and the most common allergen was detected as pollen. Colgecen et al. found positivity for at least one allergen in 52.8% of patients with idiopathic generalized pruritus, while the most frequently positive allergen was banana (6). There have been relatively few studies on allergen sensitivity in idiopathic generalized pruritus.

Allergic rhinitis is one of the most common childhood diseases, affecting approximately 10-

Table 3: Comparison of Patients with and without SPT Positivity

		SPT		
		Positive	Negative	p *
Age (median (IQR))		26.0 (18.0-39.0)	26.5 (21.0-39.5)	0.516 **
		Number (%)	Number (%)	
Gender	Female	44 (57.9)	32 (42.1)	0.105*
	Male	14 (41.2)	20 (58.8)	
Educational Status	Primary school	15 (55.6)	12 (44.4)	0.932*
	Middle school	14 (56.0)	11 (44.0)	
	High school	11 (47.8)	12 (52.2)	
	University	18 (51.4)	17 (48.6)	
Marital Status	Single	29 (50.9)	28 (49.1)	0.687*
	Married	29 (54.7)	24 (45.3)	
Allergic Disease History	Yes	7 (12.1)	9 (17.3)	0.437*
	None	51 (87.9)	43 (82.7)	
Family History (Allergic condition)	Yes	13 (56.5)	10 (43.5)	0.682*
	None	45 (51.7)	42 (48.3)	
Disease Duration (median (IQR))		12.0 (3.0-60.0)	12.0 (3.0-36.0)	0.931 **

*Chi-square analysis, ** Mann Whitney U, IQR: Inter Quantile range

40% of the population (21-23). Genetics and environmental factors play a role. It results from an exaggerated response of the hyper-reactive immune system to specific allergens (22). In our study, while SPT positivity was 53.3% in allergic rhinitis patients, positivity for the most common pollen allergen (40%) was detected. Kahraman et al. argued that pollen allergy is more common in areas with a continental climate in patients with allergic rhinitis, and house dust allergy is more common in areas close to sea levels (11). In studies conducted with patients with allergic rhinitis, the most common allergen was reported to be pollen in Yozgat, Malatya, and Kayseri regions (6, 11, 24) and house dust mites in Giresun, Istanbul, Düzce, and Mersin regions (9, 22, 25, 26). Like the results in other studies, our results support this suggestion of Kahraman et al. (11).

Our study found SPT positivity at the lowest rate (18.2%) in patients with allergic conjunctivitis. In one of the eleven patients, house dust mites alone and pollen allergens were found to be positive together in the other. Cicek et al. also reported the lowest rate of SPT positivity in allergic conjunctivitis in their study (8). Studies on SPT in allergic conjunctivitis are few. In a study, it was reported that there was a positive correlation between the severity of the symptoms and the number of positive allergens in allergic conjunctivitis (27). In another study, it was reported that there was no significant relationship between disease severity and SPT positivity (28).

Allergen sensitivity varies according to the regions and allergic diseases. Our prospective study is the first to evaluate the results of SPT in allergic diseases other than asthma in the Erzurum region. We found the most common pollen sensitivity in patients with atopic dermatitis and chronic urticaria and house dust sensitivity in patients with pruritus and allergic rhinitis. More studies involving patients with angioedema and allergic conjunctivitis are needed.

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