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The relationship between symptoms and the results of the skin prick test in patients with allergic rhinitis

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Aim: To determine the relationship between skin prick test results and allergic symptoms and to discover which symptom or symptoms are more commonly associated with the skin prick test.

Materials and methods: Of the 1462 patients with a prediagnosis of allergic rhinitis (AR) who underwent the skin prick test, 495 subjects completed the symptoms inquiry form and were included in the study.

Results: Out of 495 cases, the skin prick test was found to be positive in 358 and negative in 137. No significant relationship was found between sneezing, runny nose, itchy nose, nasal obstruction, headache, postnasal drip, and skin prick test positivity ($P > 0.05$). There was a significant relationship between ocular complaints (watering, itching, discharge) and skin prick test results ($P = 0.027$). The groups with positive and negative skin prick test results were compared in terms of symptom severity. While the difference between itchy nose and ocular symptoms was found to be significant, this difference was not significant in terms of nasal obstruction, postnasal drip, and sneezing.

Conclusion: While no significant relationship was found between symptoms accepted as allergic, such as sneezing and itchy nose, symptoms such as eye itching and watering were found to be related to allergy. We recommend performing the skin prick test routinely on patients presenting with AR symptoms. This would also prevent unnecessary antihistamine use.

Key words: Allergic rhinitis, skin prick test, allergic rhinitis symptoms

Alerjik rinitli hastalarda semptomlar ile deri prik test sonuçları arasındaki ilişki

Amaç: Deri prik test sonuçları ile alerjik semptomlar arasındaki ilişkiyi araştırmak ve hangi semptom veya semptomların deri prik test sonuçları ile daha çok ilişkili olduğunun belirlenmesi.

Yöntem ve gereç: Alerjik rinit (AR) ön tanısı ile deri prik testi yapılan 1462 hastadan semptom sorgulama formunu eksiksiz dolduran 496 hasta çalışmaya dahil edildi.

Bulgular: Deri prik testi, 496 olgudan 359'unda pozitif, 137'sinde negatif idi. Hapşırma, burun akıntısı, burun kaşıntısı, burun tıkanıklığı, baş ağrısı ve postnazal akıntı semptomları ile deri prik test pozitifliği arasında anlamlı bir ilişki saptanmadı ($P > 0,05$). Oküler semptomlar (sulanma, kaşıntı, akıntı) ile deri prik test pozitifliği arasında ise anlamlı bir fark mevcuttu ($P = 0,027$). Deri prik test sonuçları pozitif ve negatif olan gruplar semptom şiddeti açısından karşılaştırıldığında, iki grup arasında burun kaşıntısı ve oküler semptomlar açısından anlamlı fark saptanırken, burun tıkanıklığı, hapşırma ve postnazal akıntı açısından anlamlı bir fark yoktu.

Sonuç: Hapşırma, burun kaşıntısı ve burun akıntısı gibi alerjik olduğu kabul edilen semptomlarla deri prik test pozitifliği arasında anlamlı bir ilişki saptanmazken, göz kaşıntısı ve gözde akıntı gibi semptomlarla alerji ile ilişkili bulundu.Alerjik rinit semptomları ile başvuran hastalara rutin olarak deri prik testi yapılmasını öneriyoruz. Bu ayrıca gereksiz antihistaminik kullanımını da azaltacaktır.

Anahtar sözcükler: Alerjik rinit, deri prik test, alerjik rinit semptomları

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Introduction

Allergic rhinitis (AR) is a symptomatic inflammatory disease of the nose characterized by specific IgE-related hypersensitivity that emerges clinically following the exposure of the nasal mucosa to the allergen (1). AR is the most common type of allergic disease and is encountered at a rate of 10%-40% in the community (2,3). Exposure factors for allergic diseases can vary between countries or different parts of a country, and they are related to geographic, climatic, and various social circumstances (4). Allergic reactions comprise 2 phases: the early and the late phase. Early-phase allergic reaction begins with the binding of the allergen and allergen-specific IgE to the IgE receptor on the surface of mast cells and the excretion of prostaglandins and leukotrienes, mainly histamine. Late-phase reaction is characterized by infiltration of various inflammatory cells such as neutrophils and basophils (mainly eosinophils), and the excretion of cytokines (IL-4, IL-5, IL-13), chemokines, and adhesion molecules (VCAM-I, ICAM-1) along with mediators such as the histamine and leukotriene produced by these cells. T cells and mast cells are important cytokine sources, as are eosinophils and basophils (5).

The characteristic symptoms of AR are sneezing; itching of the nose, eyes, and pharynx; runny nose; and nasal obstruction (6). AR has very important effects on quality of life and school performance. High treatment costs emerge, and, due to its high prevalence, AR causes a loss of labor hours (2).

The skin prick test can be applied using commercially available inhalant and food allergens, latex, or (more rarely) drugs. It is used in the diagnosis of allergic rhinoconjunctivitis, bronchial asthma, atopic dermatitis, contact urticaria, and food and drug allergies (2-4).

The most important step in treatment is determination of the causative allergens and removal of these allergens from the environment. Antihistamines and topical steroids are effective in the control of symptoms and inflammation. When this control proves to be insufficient, drug therapy or immunotherapy must be considered as alternatives (3).

The aim of this study was to compare the correlation of AR symptoms with the results of the skin prick test.

Materials and methods

Of 1462 patients who underwent the skin prick test between January 2008 and February 2010 with a prediagnosis of AR, 495 subjects completed the symptoms inquiry form and were included in the study.

Age and sex and the presence of nasal, ocular, pulmonary, and dermatological symptoms were collected. Patients with a prediagnosis of AR were asked to complete the symptoms inquiry form. Symptoms included 5 days of sneezing, runny nose, itchy nose, nasal obstruction, headache, postnasal drip, and ocular complaints. The patients were asked to choose the option that best matched their level of complaint (absent, mild, moderate, or severe). During the assessment process, these options were given scores of 0, 1, 2, and 3, respectively. The patients were required to complete a symptoms assessment form every day in the morning.

Diagnosis of AR was made on the basis of history, physical examination findings, nasal endoscopic examination findings, and the skin prick test results. The presence of sneezing, watery runny nose, nasal obstruction, itchy nose, serous secretion in the nasal cavity, pale nasal mucosa, edematous, and pale or purple conchae was interpreted in favor of AR.

The patients were examined in terms of skin findings; the presence of rash, itching, urticaria, and erythema was recorded. Coughing, dyspnea, and wheezing were evaluated as respiratory symptoms. The skin prick test was not performed on patients who had been treated with a diagnosis of asthma, on those who were suspected of asthma, or those who had been using beta-blockers. The skin prick test was performed on patients who were thought to have isolated AR. Patients diagnosed with dermographism were excluded from the study.

Alyostal ST-IR (Stallergenes S.A., Antony Cedex, France) standard allergen extracts were used for the skin prick test. In preparation for the skin prick test, antihistamines were withdrawn 10 days prior, H2 receptor blockers were withdrawn 24 h prior, and antidepressant drugs were withdrawn 20 days prior to testing. Allergen extracts taken in standard doses in quick-test applicators with 8 distinct edges were applied to the skin after the ventral part of the

forearm was cleaned with alcohol. The results were evaluated 15 min later. Histamine hydrochloride was used as a positive control, and isotonic NaCl was used as negative control. The validity criterion for the test were accepted as >3 mm for positive control and <3 mm for negative control. Skin reaction against the allergen with an induration of >3 mm in diameter was accepted as a positive reaction (7).

Using a total of 4 applicators, the 30 most common allergen extracts and positive and negative controls were applied to the skin of the forearm for the skin prick test. The allergens used were 2 house dust mites, 3 fungal spores, 1 insect, 3 animal epithelia, 15 pollens, and 6 food allergens.

Statistical analysis

Statistical analysis was performed using the SPSS 15.0 program (SPPS Inc., Chicago, IL, USA). Consistency of the data with a normal distribution was assessed using the Kolmogorov-Smirnov test. Parametric measurements were made using the intergroup independent Sample's t-test, and nonparametric measurements were made using the Wilcoxon test and the Mann-Whitney U-test. $P < 0.05$ was considered statistically significant.

Results

A total of 495 subjects were included in the study. According to skin prick test results, patients were divided into 2 groups, positive and negative. The skin prick test was found to be positive in 358 and negative in 137 subjects. The mean age of the patients was 31.7 ± 12.4 (range: 15-66) years in the negative group and 33.6 ± 12.1 (range: 15-73) years in the positive group, and there was no statistical difference between the groups. The distribution of the patients according to sex is presented in Table 1.

Table 1. Distribution of sex between the groups.

		Group	
		Negative	Positive
Sex	Female	88 (64.2%)	262 (73.2%)
	Male	49 (35.8%)	96 (26.8%)
Total		137 (27.7%)	358 (72.3%)

When the groups were compared in terms of symptoms (sneezing, runny nose, itchy nose, nasal obstruction, headache, and postnasal drip), no significant relationship was found ($P > 0.05$). A significant difference was found in terms of ocular complaints (watering, itching, discharge) ($P = 0.027$). A symptom graph comparing the groups is presented in Figure 1, and the mean daily scores of ocular complaints are presented in Figure 2. When the groups with positive and negative prick test results were compared in terms of symptom severity, the difference between itchy nose and ocular symptoms was found to be significant. This difference was not significant in terms of nasal obstruction, postnasal drip, and sneezing (Table 2).

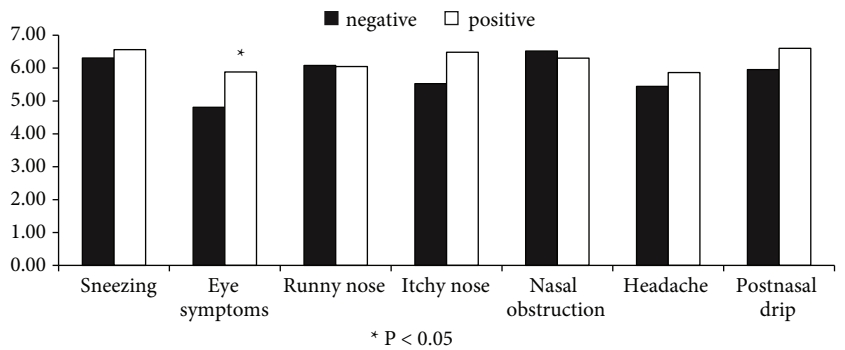

Figure 1. Symptom graph comparison of the groups.

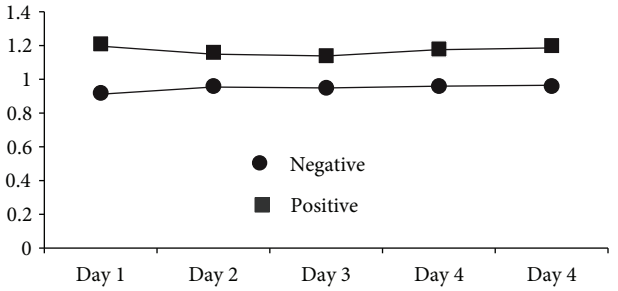

Figure 2. Mean daily scores of ocular symptoms.

Table 2. Relationship between severe symptom scores and the skin prick test.

Symptom	Prick test positive	Prick test negative	P
Nasal obstruction	65 (18.1%)	27 (19.7%)	NS
Sneezing	70 (19.5%)	20 (14.6%)	NS
Runny nose	59 (16.4%)	23 (16.8%)	NS
Itchy nose	68 (18.9%)	14 (10.2%)	0.021
Headache	63 (17.5%)	14 (10.2%)	NS
Postnasal drip	71 (19.8%)	24 (17.5%)	NS
Eye symptoms	62 (17.3%)	12 (8.8%)	0.017

NS: Not significant.

Discussion

AR is an inflammatory disease of the nasal mucosa presenting with IgE-dependent hypersensitivity reaction and characterized by paroxysmal sneezing, runny nose, nasal obstruction, and itching (8). Its prevalence is higher among women (7). The distribution of sex in our study supports the findings in the literature. Although it appears in the nose, characterizing the disease as a systemic disorder is still a subject of debate (9). Patients usually have concomitant symptoms of AR and conjunctivitis, and sometimes the entire respiratory system is affected. Conjunctival symptoms are usually mild and almost always associated with this condition. Allergens can be divided into 2 groups: intrinsic and extrinsic. House dust mites, feathery domestic animals, cockroaches, and fungal spores are accepted as intrinsic allergens; pollens of trees, grasses, and grains are considered extrinsic allergens (10).

Runny nose, nasal obstruction, sneezing, and itchy nose are the 4 cardinal symptoms of AR. The persistence of 2 or more symptoms for over 1 h in 1 day for many days is important to the diagnosis. The complaints of the patients are usually seen in the morning (3,11). Ocular symptoms and irritative symptoms (itchy nose and sneezing) are more common in seasonal AR than perennial AR (10). In AR patients, frequency, prevalence, and severity of symptoms are assessed and monitored using several quality of life questionnaires (12-14). These studies, which are carried out using questionnaire forms, include general symptom scores and allergen types.

Brown et al. (15) stated that the severity of seasonal AR symptoms is closely associated with grass pollen, and they used the conjunctival provocation test and the quantitative skin prick test for a single pollen in the assessment of seasonal AR. Mediators released from mast cells are effective in creating early-phase responses in allergy, and histamine is responsible in the early-phase reaction in the conjunctival provocation test. The conjunctival provocation test and the skin prick test are markers of early-phase reaction. Late-phase reaction can be considered the most appropriate factor for clinical disease. As a result, the skin prick test can be insufficient for indicating the clinical condition, and symptom questionnaires are insufficient for prediction of the skin prick test results. Symptoms not correlating with the skin prick test or the conjunctival provocation test can be related to different specific tissue factors (16).

Radcliffe et al. (17) found no correlations among the standard skin test, the quantitative skin test, the conjunctival provocation tests, and symptom scores. They compared conjunctival and preseasonal skin test results with the seasonal symptoms and quality of life scores of 91 patients with seasonal AR. Apart from ocular symptoms, the other nonnasal symptoms were thirst, lack of concentration, and headache, which contribute to a deterioration in quality of life. Rhinitis-related quality of life can be assessed with the mini-rhinitis quality of life questionnaire, along with measurement of rhinitis symptoms using conventional methods such as symptom scores,

rhinomanometers, or nasal cytology (18). A weak correlation was found between rhinitis-specific quality of life and symptom scores. This weak correlation was explained by using the skin prick test as a target organ. In placebo trials investigating the relationship between allergy tests and clinical responses, there was no decrease in symptoms with a placebo. Bousquet et al. stated that the skin prick test showed stability in their study carried out using a placebo. Nevertheless, they found a correlation between the quantitative skin prick test and seasonal AR (19). Studies in the literature investigating the correlation between symptom questionnaires and skin prick tests have usually focused on the relationship between allergen types and/or skin prick test positivity and general symptom scoring.

Chaiyasate et al. (20) could not find a significant difference between persistent and total symptom scores in their study investigating the predictive symptoms for positive skin prick tests in 434 patients. In the same study, severe itchy nose was found to be more prevalent in the group with positive skin prick tests; however, no significant differences were found between the symptoms in terms of predictive value when symptom characteristics were compared. In our study, ocular symptoms were also found to be significantly more prevalent, together with itchy nose, when severe symptom scores were compared (Table 2).

Although sneezing, runny nose, and itchy nose are common symptoms of AR, no statistically significant relationship was found between skin prick test positivity in patients who had presented to our clinic with these complaints. Thus, the presence of these symptoms alone seems to be insufficient for the diagnosis of AR in patients with allergic complaints. Diagnosis must be confirmed with a skin prick test. Beginning antihistamine treatment for nasal symptoms only increases treatment costs and leads to unnecessary drug use.

In our study, the correlation value between the ocular symptoms in particular, among AR complaints, and skin prick test results was found to be higher than for nasal symptoms.

Conclusion

No significant relationship was found between skin prick test results and allergic symptoms such as sneezing and itchy nose. Eye symptoms such as eye itching and watery eyes were found to be related to skin prick test positivity.

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