

Evaluation Of Autologous Serum Skin Testing Results In Patients With Seasonal Allergic Rhinitis

Gül Aslıhan Çakır Akay¹, Esin Yalçınkaya²

1 Ufuk University, Dermatology Department, Ankara, Turkey

2 Medisun Private Hospital, Otorhinolaryngology Department, Ankara, Turkey

Abstract

Objective:

Autologous serum skin testing is a practical test for basophil histamine release which is used in the diagnosis of chronic autoimmune urticaria. Although the exact autoimmune pathogenesis of allergic diseases of the upper respiratory tract remains a matter of debate, recent studies have reported positive results for autologous serum skin test in both allergic and non-allergic rhinitis, asthma sufferers, and even in healthy controls. In this study, we aimed to evaluate positive results from autologous serum testing in patients with allergic rhinitis and to compare the results with those from healthy controls.

Methods

The study included 76 seasonal allergic rhinitis patients and 51 healthy volunteers aged between 18-65 years who underwent autologous serum skin testing. A chi-square test was used for comparisons between the two groups.

Results

Autologous serum testing proved positive in 29 of the patients with allergic rhinitis and in 10 of the healthy controls. The number of positive results from autologous serum testing was found to be significantly higher in patients with allergic rhinitis than in the control group.

Conclusion

Autologous serum skin testing may have benefits beyond merely detecting chronic urticaria. In the present study, the number of allergic rhinitis patients who demonstrated autologous serum skin testing positivity was significantly higher than the healthy controls. The findings of the present study may contribute further studies that investigate common pathological mechanisms of allergic rhinitis and chronic idiopathic urticaria patients who show positivity to autologous serum skin testing.

Keywords: Allergic rhinitis, skin tests, urticaria.

Introduction

Allergic rhinitis (AR) is a hypersensitivity reaction to inhaled allergens that is mediated through IgE and is characterized by rhinorrhea, sneezing and nasal congestion.^[1] Whilst AR is often diagnosed clinically, the detection of allergen-specific immunoglobulin E (Ig E), positive skin prick testing and total serum IgE quantification may also be needed to make the diagnosis.^[2] After prolonged exposure to allergen in amounts exceeding a minimum threshold, the antigen is displayed by antigen presenting cells to CD4+ T lymphocytes. Interleukins 3, 4, 5 and other

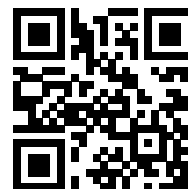
Th2-associated cytokines are released, leading to the production of immunoglobulin E. Reactions triggered as a result of repeated exposures after being sensitized to an allergen result in patients' displaying the characteristic symptoms of AR.^[2,3]

Autologous serum skin tests (ASST) are used to demonstrate the existence of autoantibodies to IgE or the high affinity IgE receptors (FcεRI) or of factors that cause histamine release in the serum of patients with chronic urticaria^[4]. ASST positivity has been reported in 30-60% of

Correspondence: Esin Yalçınkaya
Medisun Private Hospital, Otorhinolaryngology Department, Ankara, Turkey
e-mail: esinkbbesin@gmail.com

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patients with chronic idiopathic urticaria (CIU) and thus offers supportive evidence for the autoimmune pathogenesis of urticaria^[5,6]. Recent studies have shown that these autoantibodies are present in patients other than those with chronic urticaria, indeed, even in healthy controls^[7-11]. The aim of this study was to evaluate ASST results in individuals with AR and to compare these with the results obtained in healthy controls.

Materials and Methods

The study was approved by the local ethics committee. The ARIA guidelines (Allergic Rhinitis and its Impact on Asthma) including the 2017 revisions, were followed to diagnose seasonal AR in the present study. The study included 76 seasonal AR patients and 51 healthy volunteers aged between 18-65 years. The total IgE levels were recorded for each case in AR group. Patients with atopic and non-atopic AR were distinguished from each other. If antihistamine therapy was already in use, the medication was halted one week prior to testing. ASST was performed for each participants with a sample of venous blood was collected using a sterile 27 gauge 10mL syringe. The samples placed in glass test tubes without anticoagulant and left to coagulate at room temperature for a period of 30 minutes. The serum was then spun at 500g for 15 minutes using a centrifuge. In both the control and patient groups, a 0.05 mL autologous serum was injected intradermally into the forearm, as was 0.05mL physiological saline, some distance apart from each other. After waiting 30 minutes, the test was evaluated: a weal with a minimum of 1.5 mm greater diameter than the weal produced by the control (i.e. saline injection), was taken as a positive result.

The data were analyzed using the SPSS 22.0 (SPSS Inc.; Chicago; IL; USA) application. The following descriptive statistics were noted: frequency (%) for categorical variables, mean±standard deviation plus median (minimum-maximum) for continuous variables. A chi-square test was used to compare the positivity of ASST between the patient and control groups. The subgroups within the AR cases were compared in terms of positivity of ASST by means of a chi-square test. A value for $p < 0.05$ was considered statistically significant.

Results

The mean age of the patients with AR was 33.13 ± 8.45 whereas the control group was 31.61 ± 8.64 . Of the 76 patients with AR, 56.5% were male and 43.5% were female.

45.1% of the 51 patients in the control group were male and 54.9% were female. There was no statistically significant difference between the two groups in terms of age or sex (χ^2 $p=0.332$, $p=0.204$). The mean duration of symptoms was 15.36 ± 26.345 months in patients with AR. 22.3% of the patients with AR were atopic and 77.7% were non-atopic. ASST proved positive in 29 (38.2%) of the patients with AR and in 10 of the healthy controls (19.6%). The number of positive results from ASST was found to be significantly higher in patients with AR than in the control group (Table 1). No statistically significant difference was observed in the positivity of ASST between AR patients with or without atopy, patients with an IgE level above or below 100, or between male and female AR sufferers (Table 2). Duration of symptoms was not statistically different between the AR patients with or without ASST positivity (Table 2). ASST was found to have a sensitivity of 38.1% and a specificity of 80.3% in the detection of AR.

Table 1. Comparison between the patients with allergic rhinitis and the control group in terms of positive ASST result.

	ASST positive n (%)	ASST negative n (%)	p
Patients with allergic rhinitis	29 (38.2)	47 (61.8)	0.03
Control group	10 (19.6)	41 (80.4)	

ASST: Autologous serum skin test

Discussion

The role of ASST in demonstrating the presence of circulating IgE or IgE autoantibodies generated to high-affinity IgE receptors in CIU has been known about for a long time^[4,12,13]. Also, these autoantibodies have also been reported in the literature for conditions other than CIU, such as non-idiopathic urticaria, both allergic and non-allergic respiratory disorders and even in healthy individuals^[7,14-16]. In the study of Mari^[7], the rate of positive ASST was reported to be between 29.8 and 47% in patients whose symptoms resembled those of an allergic condition, and between 40.5 and 45% in the healthy control individuals. The authors concluded that cases in which there were respiratory symptoms resembling those of an allergic response but without IgE acting as a mediator, and labelled “non-allergic asthma and rhinitis” were in fact the response of the respiratory system to CIU. Taşkapan et al.^[16] have reported ASST to be positive in 20% of cases of non-allergic rhinitis and asthma, in 17.5% of cases of allergic bronchial

Table 2. Comparison of positivity for ASST in allergic rhinitis subgroups and comparison of symptom duration in groups that were positive or negative on ASST.

	ASST positive n (%)		ASST negative n (%)		P value (?)
Atopy (n=76)					
Present	7 (41.2)		10 (58.8)		0.771
Absent	22 (37.3)		37 (62.7)		
IgE (n=76)					
>100	10 (38.5)		16 (61.5)		0.969
<100	19 (38.0)		31 (62.0)		
Sex (n=76)					
Female	13 (39.4)		20 (60.6)		0.846
Male	16 (38.2)		27 (61.8)		
	ASST positive		ASST positive		P (Mann Whitney U)
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	
Duration of symptoms (n=76)	18.59±32.69	5 (1-120)	13.36±21.68	5 (1-120)	0.897

ASST: Autologous serum skin test, AR: Allergic rhinitis, min: minimum, max: maximum

asthma and in 52.5% of cases of CIU. The results from our research give a higher level of ASST positivity for AR sufferers (38.2%) than shown in the research conducted by Taşkapan *et al.* Additionally, our results show a lower rate of ASST positivity in healthy controls than was found by either Mari (45%) or Taşkapan *et al.* (55.55%). Looking at the wide range (0-45%) reported in the literature for ASST positivity in healthy controls, we may question whether this variation is in fact down to differences in the test procedure itself.^[17] The positive results seen in healthy controls may be an indication that ASST could be used to indicate which individuals have a predisposition to develop allergic responses. Guttman-Yassky *et al.*^[11] reported 53.1% ASST positivity in CIU, 29.8% in seasonal AR, and 29.8% in healthy individuals. They proposed the idea that ASST is not merely of use in identifying autoimmune urticaria, but also may be of benefit in showing those atopic individuals who are at risk of developing symptoms of allergy. However, in the present study, ASST positivity was not statistically different between the AR patients with or without atopy. The discrepancy may be due to the different criteria used to define ASST positivity between two studies. Guttman-Yassky *et al.*^[11] described positivity of ASST as a wheal of 5 mm diameter or greater, whereas it was 1.5 mm in the present study.

In another recent study conducted in patients with respiratory disorders (seasonal AR, chronic asthma), in contrast to our study, there was no significant difference between the respiratory disorder sufferers and the healthy controls in terms of ASST positivity.^[18] However, in the same study, in parallel with our study findings, there was no difference in ASST positivity between patients with atopic and non-atopic allergic respiratory disease. Also, there was no difference between the groups who were positive or negative for ASST in terms of the duration of their symptoms which was similar to the results of the present study. In this study, a wheal of greater than 3 mm diameter was considered a positive result. But, if the cut-off value was taken as 1.5 mm wheal diameter, as in our study, the sensitivity of ASST would increase from 14.3% to 20.9%. Kurt *et al.* found sensitivity to be a little higher than the level found in our study, 38.1%. The positivity of ASST was reported more frequent in younger women, however, age and sex did not demonstrate any effect on outcome of the test in our study.^[7,8,16]

Since our study did not involve CIU cases, a comparison between CIU cases and non-allergic rhinitis or asthma was not possible, which was one of the limitations of our study. ASST positivity in cases with AR seems to be higher in our study than the rates reported in the literature.

Although not supported by the histamine release test, the higher rate of ASST positivity in AR patients compared to healthy controls supports the presence of functional autoantibodies against circulating IgE or FcεRI receptors in these patients. Our findings support the idea of the presence of a serum factor in patients with chronic urticaria and with AR leading to histamine release from different tissues reported in the literature.

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Conclusion

ASST may have benefits beyond merely detecting chronic urticaria. In the present study, the number of AR patients who demonstrated ASST positivity was significantly higher than the healthy controls. The findings of the present study may contribute further studies that investigate common pathological mechanisms of AR and CIU patients who show positivity to ASST.

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