Key Nasal Symptoms Predicting a Positive Skin Test in Allergic Rhinitis and Patient Characteristics According to ARIA Classification

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Objective: *To find predicting symptom(s) in patients with a positive skin test, and identify patient characteristics according to ARIA classification.*
Material and Method: *Four hundred and thirty four rhinologic patients were retrospectively studied. Nasal obstruction, rhinorrhea, itching, sneezing, and smell dysfunction were assessed. Patients were also classified according to the ARIA guideline.*
Results: *Of 434 patients, 277 (63.8%) were skin prick test positive. There was no statistical difference in sex, but the mean age of the positive skin test group was lower than that in the negative group ($p < 0.05$). Intermittent or persistent symptoms and total symptom score were not significantly different. Severe nasal itching was more common in the positive group ($p = 0.04$). The impact of symptoms was similar between the two groups, except for self-reported comorbidity, which was higher in the negative group ($p = 0.039$).*
Conclusion: *There were no predicting symptoms and no difference in the symptom characteristics for the patients with positive skin test.*

Keywords: *ARIA classification, Rhinitis, Allergic*

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Allergic rhinitis is defined as an IgE mediated inflammation of the nose in the response against allergen[1]. It was classified as seasonal and perennial type, however, majority of the patients have symptoms unrelated to seasons. Since the development of an ARIA allergic rhinitis guideline[1,2], patients with allergic rhinitis have been classified into mild/moderate-severe and intermittent/persistent groups according to the severity and duration of symptoms. Diagnosis is made from the history of nasal symptoms and positive allergen specific IgE using either a skin or blood test. The cost and availability of allergic testing make it difficult to use the same diagnostic procedures in all parts of the world. The first objective of the present study was to find predicting symptom(s) in patients with a positive skin test for specific allergens. The second was to identify patient characteristics according to the ARIA classification system.

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Material and Method

A retrospective cohort study was done in a tertiary care center in Chiang Mai University Hospital. Four hundred and forty seven patients, who underwent a skin test at the Department of Otolaryngology in 2006, were studied. After excluding patients who had dermatologic symptoms, 434 rhinologic patients were included. Of these, 169 were male (38.9%) and 265 were female (61.1%). The following nasal symptoms were assessed in each patient: nasal obstruction, rhinorrhea, itching, sneezing, and smell dysfunction. All but the last symptom were graded in the following scale; 0 = absent, 1 = mild (symptom was present but not troublesome), 2 = moderate (symptom was frequent but did not interfere with normal activity), and 3 =

severe (symptom was troublesome and interfered with normal activity). Smell dysfunction was graded as 0 = normal function, 1 = hyposmia, and 2 = anosmia. The impact of symptoms was classified in moderate-severe if there was one or more of the following items: sleep disturbance/ impairment of daily activities, leisure, or sport/impairment of school, or work/troublesome symptoms. Patients were classified by physicians as mild/ moderately-severe and intermittent/persistent according to the ARIA guideline[1,3].

A skin prick test was carried out for house dust, mites (*Dermatophagoides farinae* and *D. pteronyssinus*), cockroach, kapok, cotton, dog, cat, feathers, bermuda grass, Johnson grass, *Penicillium*, *Alternaria*, and *Aspergillus* (the extracts from ALK AbellO, USA). Positive skin test was defined as equal as or more than 3 mm wheal, with flare for at least one allergen. Multiple sensitizations referred to at least four positive reactions in the skin test[4]. Indoor allergens were house dust, mites, and cockroach[4,5].

The research conduct was approved by the Faculty Research Ethics Committee.

Statistical analysis

Parameters were analyzed by the SPSS program version 11.0.

Ordinal symptoms were tested with the Mann-Whitney U test, continuous parameters with the t-test, and other dichotomus parameters with the Chi-square test.

Results

Of 434 tested patients, 277 (63.8%) were positive (Table 1). There was no statistical difference in sex between the positive and negative skin test groups, but the mean age of the positive skin test group was lower than that in the negative one (32.4 vs. 39.4: $p < .05$). Symptoms, classified as intermittent or persistent, and total symptom score, were also not significantly different between the two groups. Of the positive skin test patients, 25 (9%) were classified as mild intermittent, 12 (4.3%) as mild persistent, 121 (43.7%) as severe intermittent, and 119 (43%) as severe persistent.

The most common nasal symptom was nasal obstruction (89.5%), followed by sneezing (82.7%), and rhinorrhea (81.9%). The presence of assessed nasal symptoms, nasal obstruction, rhinorrhea, itching, sneezing, and smell dysfunction, had no statistical difference between the positive and negative skin test groups (Table 2). Itching severity was higher in the positive skin test group (Mann-Whitney test, $p = 0.04$). Impact of symptoms was similar between the groups, except for self-reported comorbidity, which was higher in the negative skin test group (Chi-square test $p = 0.039$).

The most common aeroallergen giving positive skin test reaction was mites, *D. farinae* (82.7%) and *D. pteronyssinus* (81.2%) (Table 3). The four most common allergens were indoor ones followed by grass pollen, feather, and cat. Only 13% of the patients were positive to one allergen and 53.4% were defined as multiple allergies (data were not shown). Almost all skin test positive patients (96.4%) were sensitive to indoor allergens and 2.5% had pollen allergy (Table 4). There was no statistical difference in symptom characteristics between both groups.

Discussion

Since the ARIA classification was applied for the treatment of allergic rhinitis[3], patients have been treated according to their severity of symptoms. Bauchau et al[6] studied 9,646 telephone interviews and found that 70% of allergic patients were classified in the intermittent, and 30% in the persistent group. Bousquet et al[7], on the other hand, studied 3,052 patients consulting in primary care and found 4% as mild intermittent, 3% as mild persistent, 42% as moderate/severe intermittent and 51% as moderate/ severe persistent. Van Hoecke et al[8] studied 804 patients consulting in general practice and found 8.6% as mild intermittent, 2.1% as mild persistent, 55.3% as moderate/severe intermittent, and 34% as moderate/ severe persistent. These findings were supported by the present study, which found 86.7% of the patients in the moderate/severe group, and the severity of symptoms forced them to seek medical help (Table 1). In the present study, the demographic data showed no difference between the positive and negative skin test groups, except for the mean age in the positive group being lower. In the population based study of Pallasoho et al[4], it was also found that skin sensitization was lower in older age; 56.8% (age 26-39 years) to 35.6% (age 50-60 years). There was no difference in the severity of symptoms between the positive and negative skin test groups. Unlike the previous classification of perennial and seasonal type, the ARIA classification guides the health care providers to proper treatment as a stepwise medical treatment[1,9]. For example, persistent and/or moderate/ severe symptoms should be treated with intranasal glucocorticoid.

Table 1. Patient information

Parameters	Positive skin test	Negative skin test	Total	p-value
Patients	277 (63.8 %)	157 (36.2%)	434	
Male	112	57	169 (38.9%)	NS
Female	165	100	265 (61.1%)	
Mean age	32.4 (6-70)	39.4 (7-84)		t-test 0.000
SD	± 14.5	± 16.5		NS
Intermittent symptoms	146 (52.7%)	70 (44.6%)	216 (49.8%)	NS
Persistent symptoms	131 (47.3%)	87 (55.4%)	218 (50.2%)	
Mild intermittent	25 (9%)	12 (7.6%)		NS
Mild persistent	12 (4.3%)	9 (5.7%)		NS
Moderate/severe intermittent	121 (43.7%)	58 (37%)		NS
Moderate/severe persistent	119 (43%)	78 (49.7%)		NS
Total symptom score	6 (1-13)	5.7 (1-13)		NS

NS no statistical significance

Table 2. Symptom characteristics

Nasal Symptoms	Number of symptoms present in		Chi-square test	Mann-Whitney test
	Positive skin test group (278 patients)	Negative skin test group (159 patients)		
Nasal obstruction	248 (89.5%)	143 (91.1%)	NS	NS
Sneezing	229 (82.7%)	127 (80.9%)	NS	NS
Rhinorrhea	227 (81.9%)	118 (75.2%)	NS	NS
Itching	211 (76.2%)	112 (71.3%)	NS	0.04
Smell dysfuntion	102 (36.8%)	55 (35%)	NS	NS
Impact of symptoms				
Sleep disturbance	107 (38.6 %)	74 (47 %)	NS	
Impairment of daily activities, leisure, sports	120 (43.3 %)	63 (40.1 %)	NS	
Impairment of school/work	42 (15.2 %)	30 (19.1 %)	NS	
Troublesome symptoms	159 (57.4 %)	86 (54.8 %)	NS	
Self-reported comorbidity*	150 (54.2 %)	101(64.3 %)	0.039	

* Hearing impairment, sinusitis, asthma, sore throat, hoarseness

From Table 2, although all the assessed nasal symptoms were found higher in the positive skin test group, the only statistical significance was the severity of nasal itching. In the study of Ciprandi et al[5], nasal obstruction was the key symptom in hay fever patients representing allergic inflammation. This suggested that more studies of cytokines and mediators in comparison between allergic and non-allergic nasal symptoms are needed. The symptoms and impact of symptoms were not statistically different between the positive and negative skin test groups, except for self-reported comorbidity. Non-allergic rhinitis may have also had an impact on the lower airway and other systems, and this warrants further studies.

Of the allergens tested, the four most common were indoor (Table 3). These findings were different from Western studies such as those by Pallasaho et al. and Bauchau et al[4, 6], in which pollen allergy was more common. This could be the result of different geography, climate, and lifestyle. Bousquet et al[10] not only found persistent symptoms more common in mite allergy, but also in pollen allergy. In the present study, most of the patients had mite allergy and there was no difference in persistent/intermittent

Table 3. Results of allergen skin prick tests

Allergen	Number of positive results in 277 patients	Percent
D. farinae	229	82.7
D. pteronyssinus	225	81.2
House dust	180	65.0
American cockroach	156	56.3
Bermuda grass	65	23.5
Feather	42	15.2
Johnson grass	39	14.1
Cat	36	13.0
Kapok	25	9.0
Cotton	26	9.4
Dog	11	4.0
Penicillium	9	3.2
Alternaria	6	2.2
Aspergillus	6	2.2

Table 4. Comparison of allergen and symptom characteristics

	Intermittent symptom	Persistent symptom	Total	p-value
Pollen	4 (57.1%)	3 (42.9%)	7 (2.5%)	NS
Indoor allergen	108 (53.7%)	93 (46.3%)	201 (72.6%)	NS
Mixed	31 (47%)	35 (53%)	66 (23.8%)	NS

symptoms between indoor and outdoor allergens (Table 4). These symptoms might also come from other factors, thus giving the non-allergic group the same result.

Conclusion

In the present study, the incidence of positive skin tests for rhinitis patients was 63.8%. There were no predicting symptoms for a positive skin test, although nasal itching was the worst symptom in this group. There was no difference in symptom characteristics and severity between the positive and negative skin test groups, except for self-reported comorbidity, which was more common in the negative one. There should be further studies in this area, especially in non-allergic rhinitis because it also affects the patients' quality of life.

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อาการทางจมูกที่ช่วยทำนายผลการทดสอบผิวหนังในผู้ป่วยภูมิแพ้

สายสวาท ไชยเศรษฐ, กรรณิการ์ รุ่งโรจน์วัฒนศิริ, สุปราณี ฟูอนันต์, ยุพา สุมิตสวรรค์

วัตถุประสงค์: *เพื่อหาอาการที่สามารถช่วย ทำนายผลการทดสอบภูมิแพ้ทางผิวหนัง และลักษณะอาการของผู้ป่วยโดยจำแนกตาม ARIA classificaiton*

วัสดุและวิธีการ: *ศึกษาย้อนหลังในผู้ป่วยที่มารับการทดสอบภูมิแพ้ทางผิวหนังด้วยอาการทางจมูก 434 ราย โดยประเมินอาการคัดจมูก น้ำมูกไหล คันจมูก จาม และการรับกลิ่นผิดปกติ จำแนกผู้ป่วยตามแนวทางของ ARIA*

ผลการศึกษา: *ผู้ป่วยทั้งสิ้น 434 ราย ผลการทดสอบผิวหนังเป็นบวก 277 ราย (ร้อยละ 63.8) ไม่พบความแตกต่างระหว่างเพศ แต่อายุของกลุ่มที่ผลทดสอบเป็นบวกน้อยกว่ากลุ่มที่ผลทดสอบเป็นลบอย่างมีนัยสำคัญ ($p < 0.05$) เมื่อจำแนกตามความถี่เป็นมีอาการเป็นครั้งคราว หรือ มีอาการต่อเนื่อง อาการทางจมูกแต่ละชนิด และผลรวมคะแนนอาการทางจมูกไม่มีความแตกต่างกันระหว่าง 2 กลุ่ม มีเพียงความรุนแรงของอาการคันจมูกที่พบมากกว่าในกลุ่มซึ่งผลทดสอบเป็นบวก ($p = 0.04$) นอกจากนี้กลุ่มที่ผลทดสอบเป็นลบ มีรายงานการเกิดภาวะแทรกซ้อนมากกว่ากลุ่มที่มีผลทดสอบเป็นบวก*

สรุป: *อาการและความถี่ของอาการทางจมูกไม่ช่วยในการทำนายผลการทดสอบภูมิแพ้ทางผิวหนัง*