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Risk factors for oral allergy syndrome in patients with seasonal allergic rhinitis

Zafer Caliskaner [1], Baris Naiboglu [2], Ali Kutlu [3], Ozgur Kartal [4], Sami Ozturk [3], Yalçın Onem [3], Mustafa Erkan [5], Mustafa Gulec [4], Cemil Colak [6], Osman Sener [7]

[1] MD, Associate Professor, Gulhane Military Medical Academy and School of Medicine, Gulhane Training Hospital, Department of Internal Medicine, Division of Allergy, Ankara, TURKEY
[2] MD, Specialist, Haydarpasa Numune Education and Research Hospital, Department of Otolaryngology, Istanbul, TURKEY
[3] MD, Associate Professor, Gulhane Military Medical Academy and School of Medicine, Haydarpasa Training Hospital, Department of Internal Medicine, Division of Allergy, Istanbul, TURKEY
[4] MD, Specialist, Gulhane Military Medical Academy and School of Medicine, Gulhane Training Hospital, Department of Internal Medicine, Division of Allergy, Ankara, TURKEY
[5] PhD, Assistant Professor, Gulhane Military Medical Academy and School of Medicine, Haydarpasa Training Hospital, Department of Orthodontics, Istanbul, TURKEY
[6] PhD, Assistant Professor, Firat University School of Medicine, Department of Biostatistics, Elazig, TURKEY
[7] MD, Professor, Gulhane Military Medical Academy and School of Medicine, Gulhane Training Hospital, Department of Internal Medicine, Division of Allergy, Ankara, TURKEY

Correspondence:
Gulhane As.Tip Akademisi
Allerjik Hastaliklar BD, Etlik
Ankara, Turkey
caliskaner@yahoo.com

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Abstract

Background: Oral allergy syndrome (OAS) is a unique allergic reaction to food, which is caused by cross-reactivity between proteins in fresh fruits or vegetables and pollens. Predisposing factors for OAS are not well known in patients with seasonal allergic rhinitis.

Objective: Identify the probable risk factors for OAS in patients with seasonal allergic rhinitis.

Study Design: One hundred and eleven consecutive patients with seasonal allergic rhinitis were included. Patients were evaluated in terms of symptom scores and skin prick test positivity scores. Prick-by-prick tests with the fresh fruit or vegetable were carried out in patients who describe oral allergy syndrome. Patients with OAS and without OAS were compared statistically.

Results: OAS was more frequent in females than males ($p=0.01$). Odds ratio for gender (male/female) was 3.80 (95% confidence interval: 1.28-11.32). Within nasal symptoms, only nasal itching was related with OAS ($P<0.05$). The logistic regression analysis revealed a significant association between the prevalence of the OAS and age, asthma, TSS and TSTP ($p<0.05$).

Conclusion: Not all patients with seasonal allergic rhinitis develop OAS. It is likely that, patients with OAS have some additional risk factors other than atopy.

Key words: *Oral allergy syndrome, anaphylaxis, seasonal allergic rhinitis.*

Introduction

Oral allergy syndrome (OAS) is a unique allergic reaction to food, which is caused by cross-reactivity between proteins in fresh fruits or vegetables and pollens, and occurs in up to 70 % of patients with allergic rhinitis with pollen allergy. Symptoms usually include itching and burning of the lips, mouth and throat, watery itchy eyes, runny nose and sneezing. However, even in rare cases, severe allergic reactions have been reported such as vomiting and diarrhea, bronchial asthma, generalized hives and systemic anaphylaxis. The underlying mechanism can be simply described as an IgE mediated mast cell degranulation. Symptoms usually develop within minutes of consuming the food. In some case onset of reaction can be delayed up to an hour (1-3).

OAS is common, but not all pollen allergic patients develop OAS. There are some known factors that predispose to OAS, such as species of already sensitized pollens, and cross-reactivity. However, little is known about in whom patients OAS is developed. In this study, clinical characteristics of the patients with and without OAS were in comparison to identify probable risk factors for the development of OAS.

Materials and Methods

The study conducted as prospectively between March 2008 and September 2008, in two different Allergy Clinics of Gulhane Military Hospitals in Istanbul and Ankara. Study protocol has been reviewed and ethically approved by the local ethical committee of Gulhane Military Medical Academy and School of Medicine. Written informed consent obtained from all patients.

One hundred and eleven consecutive patients with seasonal allergic rhinitis were included. Demographic data and personnel or family histories of asthma were recorded.

-*Scoring of symptoms:*

Symptoms of allergic rhinitis and conjunctivitis examined individually and scored as absent, mild, moderate and severe. Sum of nasal symptom scores (nasal congestion + runny nose + nasal itching + sneezing + postnasal drip + smelling disorders) was represented as "total nasal symptom score" (TNSS, maximum 18). TNSS plus other rhinitis related symptoms (headache + itchy palate + itchy pharynx + itchy eyes + watery eyes + red eyes + gritty feeling on eyes + itchy auditory canals + ear stuffiness) were accepted as "total symptom score" (TSS, maximum 45) (Table 1).

-*Skin tests with commercial allergens:*

To confirm allergy and determine already sensitized allergens, all patients underwent skin prick tests (SPT) with common aeroallergen including house dust mites, grasses, molds, trees, weeds, molds, feathers and dander mixtures (ALK-Abelló, Madrid, Spain). Histamine (10 mg/ml, ALK-Abelló, Madrid, Spain) as positive control, and standardized diluent (0.9% sodium chlo-

Table 1. Definition of TNSS and TSS.

Total Nasal Symptom Score (TNSS)		Total Symptom Score (TSS)	
Symptoms	*Max. scores*	*Symptoms*	*Max. scores*
nasal congestion	3	TNSS	18
runny nose	3	headache	3
nasal itching	3	itchy palate	3
sneezing	3	itchy pharynx	3
postnasal drip	3	itchy eyes	3
smelling disorders	3	watery eyes	3
		red eyes	3
		gritty feeling on eyes	3
		itchy auditory canals	3
		ear stuffiness	3
Total	18	Total	45

0 No symptom
1 Mild (existent but not troubled)
2 Moderate (troublesome but not interfering with normal daily activities or sleep)
3 Severe (interfering with normal daily activities or sleep)

ride and 0.4% phenol, ALK-Abelló, Madrid, Spain) as negative control was used to exclude false negative and false positive reactions.

Antihistamines and other drugs that may affect test results cosseted before to SPT (4). Tests were performed using disposable lancets and the reactions were scored by an allergist with respect to diameters of erythema and induration:

0: no reaction,
1+: erythema ≤ 15 mm,
2+: erythema > 15 mm or induration < 3 mm,
3+: induration > 3 to 6 mm,
4+: induration > 6 mm or pseudopod formation

Sum of positive results (e.g. grass + tree, or pollens + mites) were accepted as "total skin prick test positivity" (TSTP).

-*Skin tests with fresh foods:*

Patients who describe oral allergy symptoms were evaluated with "prick by prick" test (4). Fresh fruits and vegetables used as allergen and tests scored by the same way described above. Allergens were selected according to individual patients' history.

Table 2. The comparison of patients with or without OAS.

Clinical characteristics	OAS-negative (n=95)	OAS-positive (n=16)	*p*
Age (yr)	30.24±7.68	35.55±9.11	*NS*
Gender (M/F)	71 / 24	7 / 9	***0.01****
Asthma (%)	35 (36.8%)	10 (62.5%)	*NS*
Family history of Asthma (%)	11 (12.4%)	3 (20.0%)	*NS*
Family history of Atopy (%)	49 (53.3%)	12 (75.0%)	*NS*
Median TSTP	13	14	*NS*
house dust mite	38 (40.0%)	6 (37.5%)	*NS*
grass	79 (83.2%)	12 (75%)	*NS*
weed	15 (15.8%)	4 (25.0%)	*NS*
tree	25 (26.3%)	4 (25.0%)	*NS*
Median total IgE (IU/ml)	171	419	*NS*
Median eosinophil count	200/mm^3	200/mm^3	*NS*
Median rhinitis duration (year)	9	10	*NS*
runny nose	55 (57.9%)	8 (50.0%)	*NS*
postnasal drip	20 (21.1%)	4 (25.0%)	*NS*
nasal itching	39 (41.1%)	12 (75.0%)	***0.03***
nasal congestion	42 (44.2%)	6 (37.5%)	*NS*
itchy palate	21 (22.1%)	6 (37.5%)	*NS*
itchy pharynx	15 (15.8%)	4 (25.0%)	*NS*
Median TNSS	12	11	*NS*
Median TSS	25	24	*NS*

NS: Not significant, OAS: Oral allergy syndrome, TNSS: total nasal symptom score,
TSS: total symptom score, TSTP: total skin prick test positivity
*: Fisher's exact test, **: Pearson Chi-square test

-In vitro tests:
Total IgE in serum was measured by using the microparticle enzyme immunoassay (IMX, Abbott Park, Illinois, USA), according to the manufacturer's instructions.
-Statistics:
The results were given as mean ± SD, median, number or percentage. Normality of the distribution was confirmed by the Kolmogorov-Smirnov Z test. Mann Whitney U test, Yates' corrected Chi-square test, Pearson Chi-square test and Fisher's exact test were used to compare the studied data between OAS-negative and OAS-positive groups where appropriate. Logistic regression analysis was used to assess related factors with OAS (5). Odds ratios and 95% confidence intervals were estimated. Differences were considered significant when $p<0.05$.

Results

One hundred and eleven patients (78 male and 33 female) were included in the study. Sixteen patients had OAS (14.4%). Clinical characteristics of the patients with OAS and without OAS were compared (Table 2). Only two parameters were statistically significant:
1. Gender: OAS was more frequent in females than males (p=0.01). Odds ratio for gender (male/female) was 3.80 (95% confidence interval: 1.28-11.32).
2. Nasal itching: Within nasal symptoms, only nasal itching was related with OAS ($P<0.05$).
In addition, the median total IgE level was higher in OAS positive patients; however, the differences were not significant.
We also use "logistic regression analysis" because it is particularly useful when the distributions of responses on the dependent variable are expected to be nonlinear with one or more of the independent variables (5). The logistic regression analysis revealed a significant association between the prevalence of the OAS and age, asthma, TSS and TSTP ($p<0.05$). The estimated logistic regression model demonstrated good fit based on the Hosmer-Lemeshow goodness of fit test (p=0.64). Results of logistic regression analyses are presented in table 3.

Discussion

Since its' first named by Amlot et al. in 1987 (6), several cases of OAS had been described. However, the current knowledge about this phenomenon is still incomplete. Especially prevalence of OAS is not precise (within very wide ranges). In a survey among 122 allergists, prevalence of OAS was reported as 5 % in children (with a range of 0%-75%) and 8 % in adults (with a range of 0 %-100%) (7). Definition of diagnostic criteria may yield a more precise estimation of OAS prevalence.
OAS is usually limited to mouth and symptoms quickly disappear. However, OAS has a considerable potential of systemic anaphylaxis. In other words, OAS should be considered as an important clinical picture. Initial symptoms are itching or burning sensation in the lips, mouth, and/or pharynx. These symptoms are usually self limited and only last a matter of seconds to a few minutes. Some patients may experience swelling of the lips, tongue, and uvula and a sensation of tightness in the throat. And even in rare, reaction may progress to systemic anaphylaxis (1, 8).
Since symptoms of OAS are usually mild and transient, many patients do not associate them with pollen allergy and rhinitis, do not report to physician in visits. For this reason OAS symptoms should be interviewed in all patients with rhinitis due to pollen allergy. If the diagnosis of OAS established, patients (with pollen allergy)

Table 3. Results of logistic regression analyses.

Variable	Estimate	SE	*p*	Odds Ratio	95% Confidence Interval	
					Lower	Upper
Age	0.218	0.090	*0.015*	1.243	1.042	1.483
Asthma	5.834	2.420	*0.016*	2.85	0.95	8.53
TSS	0.488	0.196	*0.013*	1.629	1.109	2.393
TSTP	0.673	0.342	*0.049*	1.961	1.002	3.836
Constant	-20.442	8.239	*0.013*			

SEM: Standard error

should be informed about possibility of hypersensitivity to certain fruits and vegetables (8).

Our results revealed some differences between patients with seasonal allergic rhinitis with and without OAS:

First, OAS was significantly frequent in female patients. Similar reports supporting our result had been published before (9, 10). This finding can be explained with presence of slight female predominance in allergic disease. Indeed, being a woman seems to be a disadvantage for atopic disorders. Asthma, food allergies and anaphylaxis are more common in females (11, 12). Experiments in rodents confirm an effect of estrogens on mast cell activation and allergic sensitization, while progesterone is shown to suppress histamine release but potentiate IgE induction (13).

Second, within the nasal symptoms, only severity of nasal itching was related with OAS. It was difficult to explain this finding until recent. Alenmyr et al. have just identified an ion channel that produces the nasal itch experienced by many patients with seasonal allergic rhinitis. This ion channel, known as TRPV1 (transient receptor potential vanilloid1), is localized to primary sensory neurons and, in animals, closely associated with histamine receptors. Patients with allergic rhinitis feature an increased itch response to TRPV1 stimulation at seasonal allergen exposure. They suggest that this reflects part of the hyperresponsiveness that characterizes on-going allergic rhinitis (14). Depending on this data, it may be hypothesized that, severity of nasal itching may be related with extent of allergic sensitization and oropharyngeal allergic responses. Some other findings were also supportive of this hypothesis. With respect to the logistic regression analysis, there was a significant association between OAS and total symptom score, and also OAS and total skin test positivity. Because of TSS and TSTP indirectly indicate severity of atopy, this statistical result may be suggested as OAS is more frequent in patients who are "more allergic".

Another striking result was significant association between OAS and asthma. Patients with both asthma and seasonal allergic rhinitis were more predispose to develop OAS than the patients with only seasonal allergic rhinitis, with respect to logistic regression analysis. In previous studies, presence of a food allergy was reported as a risk factor for the future development of asthma, particularly for children with sensitization to egg protein (15-17). In addition, persistent food allergy and degree of atopy were reported as risk factors for life-threatening asthma (8, 18). However, there is no data argued that asthma is implicated in development of OAS.

In conclusion, not all patients with seasonal allergic rhinitis develop OAS. It is likely that, patients with OAS have some additional risk factors other than atopy. Further prospective studies in large number of patients are necessary to explore why some pollen allergic patients are experience with OAS, while others not.

References

References with links to Crossref - DOI

1. Fernández-Rivas M, Benito C, González-Mancebo E, de Durana DA. Allergies to fruits and vegetables. Pediatr Allergy Immunol. 2008;19:675-81.
2. Vieths S, Scheurer S, Ballmer-Weber B. Current understanding of cross-reactivity of food allergens and pollen. Ann N Y Acad Sci. 200;964:47-68.
3. Ortolani C, Pastorello EA, Farioli L, Ispano M, Pravettoni V, Berti C, et al. IgE-mediated allergy from vegetable allergens. Ann Allergy. 1993;71:470-6.
4. Bernstein IL, Li JT, Bernstein DI, Hamilton R, Spector SL, Tan R, et al. Allergy diagnostic testing: an updated practice parameter. Ann Allergy Asthma Immunol. 2008;100:S1-148.
5. Localio AR, Margolis DJ, Berlin JA. Relative risks and confidence intervals were easily computed indirectly from multivariable logistic regression. J Clin Epidemiol. 2007;60:874-82.
6. Amlot PL, Kemeny DM, Zachary C, Parkes P, Lessof MH. Oral allergy syndrome (OAS): symptoms of IgE-mediated hypersensitivity to foods. Clin Allergy. 1987;17:33-42.
7. Ma S, Sicherer SH, Nowak-Wegrzyn A. A survey on the management of pollen-food allergy syndrome in allergy practices. J Allergy Clin Immunol. 2003;112:784-8.
8. Ausukua M, Dublin I, Echebarria MA, Aguirre JM. Oral Allergy Syndrome (OAS). General and stomatological aspects. Med Oral Patol Oral Cir Bucal. 2009;14:e568-72.
9. Ono E, Maeda Y, Tanimoto H, Fukutomi Y, Oshikata C, Sekiya K, et al. [Clinical features of oral allergy syndrome to plant foods allergens in Kanto regions]. Arerugi. 2007;56:587-92.
10. Inomata N, Morita A, Kirino M, Yamazaki H, Yamaguchi J, Yamane Y, et al. [Oral allergy syndrome due to plant-derived foods: a clinical review of 63 patients over a period of 6 years]. Arerugi. 2007;56:1276-84.
11. Jensen-Jarolim E, Untersmayr E. Gender-medicine aspects in allergology. Allergy. 2008;63:610-5.
12. Schäfer T, Böhler E, Ruhdorfer S, Weigl L, Wessner D, Heinrich J, et al. Epidemiology of food allergy/food intolerance in adults: associations with other manifestations of atopy. Allergy. 2001;56:1172-9.
13. Chen W, Mempel M, Schober W, Behrendt H, Ring J. Gender difference, sex hormones, and immediate type hypersensitivity reactions. Allergy. 2008;63:1418-27.
14. Alenmyr L, Högestätt ED, Zygmunt PM, Greiff L. TRPV1-mediated itch in seasonal allergic rhinitis. Allergy. 2009;64:807-10.
15. Tariq SM, Matthews SM, Hakim EA, Arshad SH. Egg allergy in infancy predicts respiratory allergic disease by 4 years of age. Pediatr Allergy Immunol. 2000;11:162-7.
16. Kotaniemi-Syrjänen A, Reijonen TM, Romppanen J, Korhonen K, Savolainen K, Korppi M. Allergen-specific immunoglobulin E antibodies in wheezing infants: the risk for asthma in later childhood. Pediatrics. 2003;111:e255-61.
17. Rhodes HL, Sporik R, Thomas P, Holgate ST, Cogswell JJ. Early life risk factors for adult asthma: a birth cohort study of subjects at risk. J Allergy Clin Immunol. 2001;108:720-5.
18. Roberts G, Patel N, Levi-Schaffer F, Habibi P, Lack G. Food allergy as a risk factor for life-threatening asthma in childhood: a case-controlled study. J Allergy Clin Immunol. 2003;112:168-74.