

Otolaryngologists Practice Pattern on Oral Allergy Syndrome

Allergy & Rhinology

Volume 12: 1–5

© The Author(s) 2021

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/21526567211021305

journals.sagepub.com/home/aar

Yunjia Zhang, MD¹  and Haidy Marzouk, MD¹

Abstract

Background: Oral allergy syndrome is a unique type of food allergy caused by cross-sensitivity between inhalant allergens and food allergens. Despite its significant prevalence and potentially serious outcome, the knowledge base and practice patterns on OAS are not well known among otolaryngologists. Our study is designed to understand the practice patterns of otolaryngologists in screening, testing, and treating OAS through a web-based survey.

Methods: Three thousand otolaryngologists were randomly selected from a membership list of the American Academy of Otolaryngology – Head and Neck Surgery. A survey was designed to include demographic questions and questions about OAS understanding, screening, and management. Surveys were sent to selected otolaryngologists via mail. Responses were de-identified and analyzed using SPSS.

Results: Out of the 50 survey responses, 46 reported treating environmental allergy in their practices. Twenty eight out of 46 reported knowing about OAS (60.9%). Fifteen out of the 28 physicians screened for OAS (53.6%). Out of the responders who knew about OAS, 12 (42.9%) reported diagnosing under 5 cases in the past year, 7 (25%) diagnosed 5 to 10 cases, and 7 (25%) reported diagnosed more than 10 cases in the past year. Eleven (39.3%) reported ordering component allergy testing for food allergies. Twenty six (92.9%) reported using avoidance, 18 (64.3%) prescribed oral antihistamine medications, 14 (50%) prescribed epi-pen, and 19 (67.9%) desensitized patients to environmental allergies as a treatment for OAS. 26 (93%) reported using more than one of the listed treatments. 10 (36%) reported using all four methods.

Conclusion: Only 60.9% of the responders had a knowledge of OAS. Only 53.6% of those screened for OAS. Current treatment for OAS includes avoidance of allergens, desensitization of environmental allergens, prescription of oral antihistamine and epi-pen. Nearly everyone (93%) reported using more than one treatment method.

Keywords

allergy, anaphylaxis, cross sensitivity, environmental allergy, food allergy, oral allergy syndrome, pruritus, survey

Introduction

Oral allergy syndrome (OAS), also known as pollen food allergy syndrome (PFS), is a unique type of food allergy caused by cross-sensitivity between inhalant allergens and food allergens. This disease was first described in 1940 where Tuft et al. recognized a type of food allergy caused by labile antigens found in fresh fruit extracts. The antigens causing this specific food allergy were demonstrated to be either altered or destroyed by heat during canning and stewing processes.¹ Multiple studies documented that patients with pollen allergy also had hypersensitivity towards foods such as nuts, apple, shellfish, etc.^{2,3} The term “oral allergy syndrome” was first used by Amlot et al. in 1987 as he observed the onset of symptoms immediately after ingestion of specific foods and the symptoms were confined to the upper

gastrointestinal tract. It was considered a “syndrome” by Amlot et al. because systemic symptoms such as urticaria, asthma, or anaphylaxis occurred in a proportion of the patients.⁴ Valenta and Kraft introduced the theory that sensitization to airborne pollen allergens led to the induction of IgE antibodies that cross-reacted with

¹Department of Otolaryngology & Communication, SUNY Upstate Medical University, Syracuse, New York

Submitted January 21, 2021. Revised April 16, 2021. Accepted May 12, 2021.

Corresponding Author:

Yunjia Zhang, SUNY Upstate Medical University, 750 E Adams St, Syracuse, NY 13210, USA.

Email: yunjiazhang8@gmail.com



homologous food allergens.⁵ Pollen induced IgE antibodies are able to recognize dietary allergens with the same epitopes. These proteins share similar primary and tertiary structures as they are conserved biologically for vital cellular functions. Profilin, for example, an actin-binding protein involved in the dynamic turnover and reconstruction of the actin cytoskeleton, is responsible for the cross-reaction between birch pollen and hypersensitivity in celery, melon, apple, and pear.⁶ Other pathogenesis related (PR) proteins that were identified to cause oral allergy syndrome also performed important functions in lipid transfer, ribosome-inactivation, and thaumatin like proteins.⁶ The unique property of pollen-food allergen cross-reaction sets OAS apart from other food allergies. Another unique feature of OAS is the sensitivity of OAS allergens to cooking and digestive enzymes, while allergens in simple food allergies are relatively stable and are less affected by digestive environment or cooking. Due to its uniqueness in pathophysiology and presentation, OAS should be treated as a separate entity that differs from simple food allergy. Due to the cross reactivity between pollen and food allergens, the term pollen food allergy syndrome was adopted to demonstrate the uniqueness of OAS.

The most common presentation of OAS is oral pruritus and tingling of the lips and palate. Rarely, facial rash, nasal and otic pruritus, mucosal vesicles, congestion, coryza can occur. As mentioned before, a small portion of the patients may progress to have systemic symptoms including nausea, vomiting, abdominal pain, upper respiratory obstruction, or anaphylaxis.⁴ Symptoms of OAS usually arise within minutes of ingestions of causal foods. Due to the labile nature of the allergen, symptoms are transient and terminate as allergens come into contact with digestive enzymes in the stomach.

The prevalence of OAS varies greatly between studies and the true prevalence remains unknown. In children, the reported OAS prevalence ranges from 4.7% to 26.7% with large differences between studies and geographical regions. A study of pediatric patients at a Mexican allergy clinic found a prevalence of 4.7% using skin prick testing.⁷ Dondi et al. studied a group of Italian children with allergic rhinoconjunctivitis and found an OAS prevalence of 24% among the population.⁸ Among a group of 120 pediatric patients in Croatia with seasonal allergic rhinitis, OAS was found to present in 26.7% of the patients.⁹ A survey in Japan found an OAS prevalence of 15.6% in children, with significant differences among four Japanese cities.¹⁰ In adults, the reported prevalence ranges from 20% to more than 50%. Ivičević et al. reported a prevalence of 45.7% in Croatian adults.¹¹ A Korean chart review identified a prevalence of 20% among patients with birch pollen sensitization.¹² A study in Mexico City on patients attending an outpatient allergy clinic showed a prevalence of OAS to be more than

50%.¹³ Ma et al. conducted a survey among allergists and found that the allergists estimated prevalence of OAS within patients with rhinitis to be 5% among children and 8% among adults.¹⁴ This wide range of estimated prevalence in children and adults could stem from geographical differences of the disease, specifically selected patient population, under-reporting of mild symptoms, lack of awareness, or an inconsistency in physician practice patterns. Additional studies are needed to understand this unique disease.

Despite its significant prevalence and potentially serious outcome, the knowledge base and practice patterns on OAS are not well known among otolaryngologists. Otolaryngologists treat many patients for allergies or allergic rhinitis. A large portion of these patients may also exhibit OAS symptoms and are potentially susceptible to serious consequence. As mentioned earlier, the prevalence of OAS among children and adults with allergic rhinitis are estimated to be up to 26.7% and 50%, respectively.^{9,13} Thus, it is of vital importance for otolaryngologists to practice with the knowledge of OAS and its treatments in mind. Our study is designed to understand the practice patterns of otolaryngologists in screening, testing, and treating OAS through a web-based survey.

Methods

This study received a waiver from the institutional review board of our institution. Three thousand otolaryngologists were randomly selected from a membership list of the American Academy of Otolaryngology – Head and Neck Surgery. A survey was designed to include demographic questions and questions about OAS understanding, screening, and management. A link to the survey was sent via USPS along with a letter that described the intentions of our study. Responses were de-identified and confidential. (Mailings were sent out on 6/10/2020 and collection stopped on 8/10/2020). Information collected in the survey is outlined in Table 1.

As of 8/10/2020, fifty out of three-thousand surveys were completed for analysis. Fifty-three mails were returned as of 8/13/2020. However, a significant portion of returned mails were discarded without being recorded due to the mail handling system of our hospital.

Analysis was performed via SPSS statistics software as the following. The frequencies of demographic criteria were collected for the overall responses using the frequency function. The frequency and demographic composition of otolaryngologists who treat environmental allergies was calculated using the frequency function after filtering out those who do not treat environmental allergies. The same method was used to calculate the frequency and demographic composition of otolaryngologists with the knowledge of OAS. The same method was also used to calculate the types of screening methods

Table 1. Survey Questions.

1. What is your age?
 - a. 25–30 years old
 - b. 31–35 years old
 - c. 36–40 years old
 - d. 41–45 years old
 - e. 46–50 years old
 - f. >51 years old
2. I identify as:
 - a. Female
 - b. Male
 - c. Transgender
 - d. Other
3. I work in the:
 - a. Northeast
 - b. Southeast
 - c. Midwest
 - d. Southwest
 - e. Pacific coast
 - f. Not in the U.S.
4. What is your field of medicine?
 - a. General otolaryngology
 - b. Allergy
 - c. Family medicine
 - d. Other
5. My level of experience is:
 - a. Academic attending, 0–10 years
 - b. Academic attending, >11 years
 - c. Private attending, 0–10 years
 - d. Private attending, >11 years
 - e. Resident
 - f. Fellow
6. Do you treat environmental allergy?
 - a. Yes
 - b. No
7. Do you know about OAS?
 - a. Yes
 - b. No
8. Do you screen for OAS?
 - a. Yes
 - b. No
9. What method do you use to screen for oral allergy syndrome?
 - a. Written questions
 - b. Verbal history
 - c. Other
10. Approximately how many cases of oral allergy syndrome have you diagnosed in the past year?
 - a. 0–5
 - b. 5–10
 - c. >10
11. Do you order component allergy testing for certain food allergies?
 - a. Yes
 - b. No
12. How do you treat OAS? (Can select more than one answer)
 - a. Use avoidance as treatment
 - b. Prescribe oral antihistamine for treatment
 - c. Prescribe epi-pen
 - d. Desensitization to environmental allergies

Table 2. Demographic Information of Survey Responders.

Demographic criteria	Number	Percent
Age		
31–35	3	6
36–40	5	10
41–45	4	8
46–50	4	8
>50	34	68
Total	50	100
Gender		
Female	8	16
Male	41	82
Transgender	1	2
Total	50	100
Location		
Northeast	19	38
Southeast	14	28
Midwest	9	18
Southwest	4	8
Pacific coast	4	8
Total	50	100
Specialty		
General otolaryngology	43	86
Allergy	2	4
Family medicine	1	2
Other	4	8
Total	50	100
Level of experience		
Academic attending, 0–10 years	4	8
Academic attending, >11 years	7	14
Private attending, 0–10 years	3	6
Private attending, >11 years	35	70
Resident	1	2
Total	50	100

and treatments among those who screen for OAS in their practices. At last, the demographic composition of those who know about or screen for OAS was compared to those who did not know about or screen for OAS using binary logistic regression analysis.

Results

There were a total of 50 survey responses from the day of mailing to the day of analysis. Demographic information such as age, gender, location of practice, specialty, and level of experience are presented in Table 2. Sixty-eight percent of the responders were over 50 years old. Most responders (82%) reported as male gender. A majority of the responders (86%) were general otolaryngologists. Other reported specialties included allergy, family medicine, facial plastic surgery, and rhinology. Seventy percent of the responders were private attendings who have practiced for more than 11 years. Over half of the responders practice in the east coast, with 38% in northeast and 28% in southeast. Eighteen percent of the

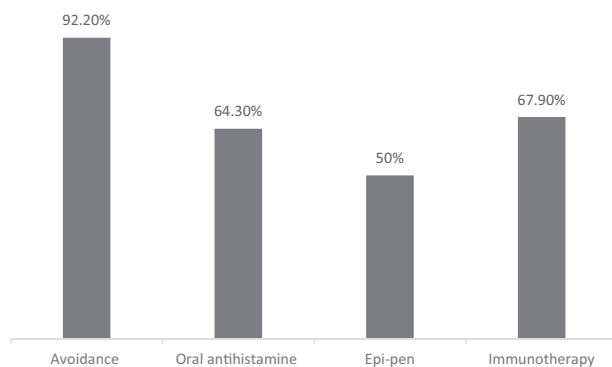


Figure 1. Treatment choices reported by otolaryngologists.

responders practice in the Midwest. Eight percent practice in southwest and pacific coast, respectively.

Forty-six (92%) responders reported treating environmental allergy in their practices. Out of those who treated environmental allergy, 28 reported knowing about OAS (60.9%). Within the 28 responders who knew about OAS, 15 physicians screened for OAS (53.6%) using either verbal or written questions, 12 (42.9%) reported diagnosing under 5 cases in the past year, 7 (25%) diagnosed 5 to 10 cases, and 7 (25%) reported diagnosing more than 10 cases in the past year. Eleven physicians (39.3%) reported ordering component allergy testing for food allergies.

In terms of treatments for OAS, 26 responders (93%) reported using avoidance, 18 (64.3%) prescribed oral antihistamine medications, 14 (50%) prescribed epi-pen, and 19 (67.9%) desensitized patients to environmental allergies Figure 1. Twenty-six (93%) reported using more than one of the listed treatments. Ten (36%) reported using all four methods.

There was no significant demographic difference comparing physicians who knew about or screened for OAS and those who did not know about or screened for OAS ($p > 0.05$).

Discussion

OAS is a unique food sensitivity that presents with oral symptoms soon after ingestion of food allergens. It is caused by cross reaction between pollen allergens and food allergens due to shared protein structures. The prevalence of OAS has been difficult to determine due to various reasons. The under-diagnosis of physicians, under-reporting by patients, and variations of the disease in different geographic regions all play a part in the discrepancies among reported prevalence. While symptoms are usually mild to moderate, they are still distressing to patients.

Otolaryngologists treat a significant number of patients with allergic rhinitis. Therefore, oral allergy

syndrome is likely to be a diagnosis encountered during practice. Our study was conducted to determine the practice patterns regarding OAS among otolaryngologists. Among the survey responders, only 60.9% had a knowledge of OAS. Only 53.6% of those who knew about OAS screened for OAS in their practice. A majority of the surveyed otolaryngologists used verbal questions as a screening method. However, given the low response rate of our study, it cannot be determined if this data can be generalized to the survey population as a whole. Current treatment for OAS includes avoidance of allergens, desensitization of environmental allergens, prescription of oral antihistamine and epi-pen. The majority of our responders who treat OAS use avoidance. Nearly everyone (93%) reported using more than one treatment method.

While the avoidance of reaction-causing foods is sufficient for OAS, it is important for otolaryngologists to recognize this condition and to advise patients of the possible serious complications such as asthma and anaphylaxis. According to our survey, only a little over half of our responders had knowledge of OAS. This result signifies the importance of raising the awareness of OAS among otolaryngologists for a pathology that may be more prevalent than known. We believe that by increasing awareness of OAS among otolaryngologists, more patients will be educated about OAS and its management. Thus, dangerous complications associated with OAS may be avoided to ensure patient safety.

Limitations of this study include a small survey responder size and a heavy representation of otolaryngologists who were older than 50 years of age and in private practice. In addition, over half of the responders practice along the east coast, with less representation of the rest of geographic locations. It was anticipated that our yield would be low given general low response yield for mail-in surveys. Future studies are needed to determine if this data is a true reflection of the knowledge base and practice patterns of otolaryngologists across the United States. Moreover, data is needed to investigate the variation in practice patterns due to different demographics. For example, certain geological locations may have higher rates of allergic rhinitis, leading to higher emphasis on allergy training during residency.

Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

Statement of Informed Consent

There are no human subjects in this article and informed consent is not applicable.

Ethical Approval

This study was approved by the SUNY Upstate Medical University institutional review board.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Yunjia Zhang  <https://orcid.org/0000-0002-8067-3592>

References

1. Tuft L, Blumstein GI. Studies in food allergy. *J Allergy*. 1942;13(6):574–582.
2. Eriksson NE, Formgren H, Svenonius E. Food hypersensitivity in patients with pollen allergy. *Allergy*. 1982; 37(6):437–443.
3. Hannuksela M, Lahti A. Immediate reactions to fruits and vegetables. *Contact Dermatitis*. 1977;3(2):79–84.
4. Amlot PL, Kemeny DM, Zachary C, Parkes P, Lessof MH. Oral allergy syndrome (OAS): symptoms of IgE-mediated hypersensitivity to foods. *Clin Immunol Allergy*. 1987;17(1):33–42.
5. Valenta R, Kraft D. Type I allergic reactions to plant-derived food: a consequence of primary sensitization to pollen allergens. *J Allergy Clin Immunol*. 1996;97(4): 893–895.
6. Price A, Ramachandran S, Smith GP, Stevenson ML, Pomeranz MK, Cohen DE. Oral Allergy Syndrome (Pollen-Food Allergy Syndrome). *Dermatitis*. 2015;26(2):78–88.
7. Azamar Jacome A, Borjas Aguilar K, Mendoza Hernández D. P281 pollen-food syndrome in a pediatric population attending an allergy clinic in Mexico city. *Ann Allergy Asthma Immunol*. 2016;117(5):S105.
8. Dondi A, Tripodi S, Panetta V, et al.; the Italian Pediatric Allergy Network (I-PAN). Pollen-induced allergic rhinitis in 1360 Italian children: comorbidities and determinants of severity. *Pediatr Allergy Immunol*. 2013;24(8):742–751.
9. Ivković-Jureković I. Oral allergy syndrome in children. *Int Dent J*. 2015;65(3):164–168.
10. Ota M, Nishida Y, Yagi H, et al. Regional differences in the prevalence of oral allergy syndrome among Japanese children: a questionnaire-based survey [published online ahead of print June 21, 2020]. *Asian Pac J Allergy Immunol*. doi:10.12932/AP-130120-0739
11. Ivičević N, Roje Ž, Kljajić Z, et al. Prevalence and risk factors for developing oral allergy syndrome in adult patients with seasonal allergic rhinitis. *Acta Clin Croat*. 2015;54(1):25–29.
12. Kim J-H, Kim S-H, Park H-W, Cho S-H, Chang Y-S. Oral Allergy Syndrome in Birch Pollen-Sensitized Patients from a Korean University Hospital. *J Korean Med Sci*. 2018;33(33):e218.
13. Morfin-Maciél BM, Flores I, Rosas-Alvarado A, et al. Sensitization to pollens of oleaceae family in a group of patients from Mexico city. *Rev Alerg Mex Tecamachalco Puebla Mex 1993*. 2009;56(6):198–203.
14. Ma S, Sicherer SH, Nowak-Węgrzyn A. A survey on the management of pollen-food allergy syndrome in allergy practices. *J Allergy Clin Immunol*. 2003;112(4):784–788.