

Self-reported allergic reactions to peanut and tree nuts occurring on commercial airlines

To the Editors:

Since publication of the first self-reported survey of in-flight peanut and tree nut allergic reactions,¹ limited follow-up data exist.² Given nearly a decade of expanded awareness and education, we sought to re-examine this subject to determine present-day characteristics from a public health perspective to inform allergists on how to better counsel and educate their patients.

In conjunction with the Food Allergy and Anaphylaxis Network, a 45-question survey was designed using Survey Monkey (Portland, Ore) and posted on the Food Allergy & Anaphylaxis Network website from mid-August 2007 to early March 2008, available to both members and visitors to the site. Electronic informed consent was obtained, and this study was approved by the University of Michigan Medical School Institutional Review Board. Two hundred eighty-five persons responded, with 150 meeting the criteria for inclusion by affirming they had an in-flight reaction to peanut or a tree nut. The remainder were excluded after completing 7 introductory questions. Respondents were not required to answer every question, and many questions allowed multiple responses. Reaction severity was graded according to published criteria for the diagnosis of anaphylaxis.³ Groups were stratified for statistical comparison on the basis of the presence or absence of symptoms constituting anaphylaxis, with differences in proportions between groups tested by using χ^2 and 2-sided Fisher exact tests where appropriate. Data were analyzed using SPSS, Version 16 (Chicago, Ill).

This group reported their 150 most severe reactions occurring on board a commercial aircraft. Table I details the baseline characteristics of this population. Table II details the symptoms reported. Fifty individuals (33.3%) reported symptoms that satisfied criteria for anaphylaxis. No fatalities were reported. Causal allergens included peanut, 64.1%; tree nut, 16.9%; both peanut and tree nut, 4.7%; and 14.3% were unsure whether the symptoms were caused by peanut, tree nut, or both. In 63.8% of the cases, respondents provided advance notification of allergy to the airline and requested special accommodations, but only 38.6% who made such a request actually received an accommodation. Preboarding notification was significantly associated with reported self-injectable epinephrine (SIE) carriage ($P = .0039$). Reported routes of exposure included ingestion, 15.7%; inhalation, 48.6%; skin contact, 27.9%; and unknown, 7.8%. Although 76% reported carrying SIE while flying, only 10.6% of these individuals used their device, and overall, only 10% (15 persons) received epinephrine (SIE or epinephrine via syringe) as treatment. All initial doses of epinephrine were administered within 15 minutes of the reaction commencing. An additional dose was required in 6 of the 15 individuals (40%). In contrast, 77% reported having H1-antihistamine available, which was administered in 71.3% of reactions. Fig 1 compares SIE and antihistamine use among respondents carrying these medications. The flight crew was alerted of a reaction occurring in 44.7% of cases. Seven individuals (4.7%) reported in-flight reoccurrence of symptoms despite treatment. Despite this reaction, 52.4% reported not making any changes in their flying behavior. In addition, 25.7% reported they no longer consume food served on

TABLE I. Respondent characteristics

Characteristic*		Response
Person responding to the study	Parent	69%
	FAI	30%
Sex of individual with food allergy	Male	46%
	Female	54%
Allergist-confirmed diagnosis of food allergy		78%
Physician-made diagnosis of food allergy		94%
Report peanut allergy		87%
Report tree nut allergy		71%
Report peanut and tree nut allergy		62%
Median age of onset	Peanut Allergy	1 year
	Tree Nut Allergy	3 years
Comorbid atopic conditions reported	Allergic Rhinitis	64%
	Asthma	53%
	Atopic Dermatitis	51%
	Other Food Allergy	14%
Have experienced more than one lifetime on-board reaction		42%

*Respondents were allowed to select multiple responses where appropriate.

TABLE II. Symptoms reported

Symptom reported*	Percent
Itching	56.5
Hives	47.3
Flushing	37.4
Wheezing	28.8
Throat itching	27.4
Swelling of the eyes/lips/face	24.7
Cough	22.6
Dyspnea	17.8
Throat tightness/swelling	15.1
Vomiting	7.5
Diarrhea	3.3
Hypotension (verified by cuff measurement)	1.4

*Respondents were allowed to select multiple responses.

board, 23.8% now clean their personal seating area, and 20% request a peanut or tree nut-free flight. Twelve percent reported no longer flying commercially as a result of this reaction.

We highlight several key findings. Allergic reactions to peanut and tree nut have continued to occur on commercial aircraft. Reaction severity appears poorly perceived—33.3% reported symptoms consistent with anaphylaxis, but epinephrine, available on all flights either with the passenger themselves or in the on-board medical kit,⁴ was used in only 10% of reactions, potentially a dangerous discrepancy. Denial of requests for special accommodations for a food allergy is an unfortunate reality, because many airlines have firmly written policies that accommodations will not be made.⁵ Given that other passengers may bring allergen-containing food on board, no airline can guarantee a completely peanut-free or tree nut-free flight. It is of concern that 52% reported making no behavioral changes on the basis of this reaction. This may have influenced the 42% rate for having multiple in-flight reactions, indicating that more education is needed

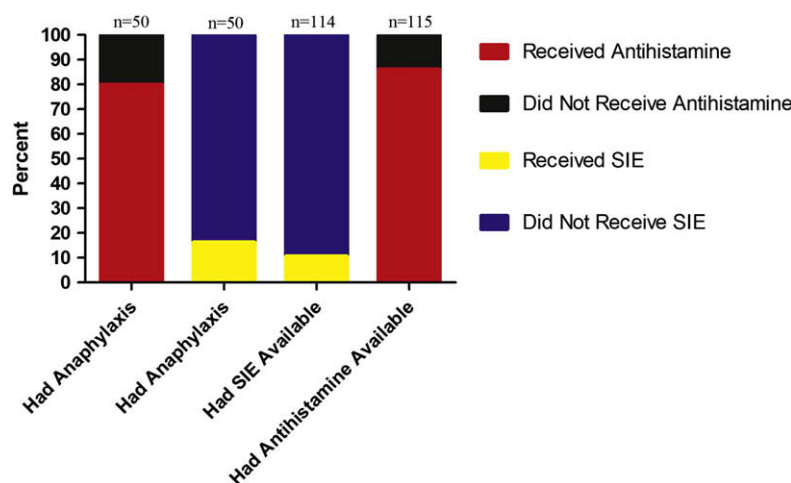


FIG 1. Comparison of SIE use versus H1-antihistamine use. The percentage of respondents with anaphylaxis who received SIE or H1-antihistamine is shown, as is the percentage that had either treatment available and received it for this in-flight reaction.

to protect individuals with food allergy flying commercially. That 88% continue to fly despite their reaction indicates the necessity of air travel, a difficult reality facing an individual with food allergy.

Earlier work by Sicherer et al¹ and more recent work by Comstock et al² found similar low rates of epinephrine use to treat in-flight reactions, consistent with our findings, though both had smaller sample sizes than ours. These authors' work only serves to reinforce the findings that we present here, and highlight limited improvement in this area over the period of the past 9 years. In fairness to the overall scope of this problem, however, in-flight medical events are rare, occurring as frequently as 1 event per 753 flights, with allergic reactions accounting for 1.7% to 4.6% of all in-flight medical events.^{6,7}

This study has several limitations. Self-reported data are limited by recall bias, selection bias, underreporting and overreporting, and difficulty in assessing the validity of the diagnosis or survey answers. There was an age-related bias, because only 30% of respondents answered the questions on their own behalf. The rates of inhalation exposure (48%) and contact exposure (27.9%) are high compared with those reported elsewhere. Inhalational exposure, although commonly reported, is not well supported by previous studies,^{8,9} despite peanut allergen recovery from on-board air filters.¹⁰ Resulting reactions might occur from unrecognized trace ingestion, and are mistakenly attributed to non-oral routes of exposure. Also, anxiety-induced symptoms may result from visual cues rather than allergen exposure. Such misperception of non-oral routes of exposure could be contributing to an overestimation of the true prevalence of in-flight reactions, despite this third study with subjects perceiving such routes.^{1,2}

In conclusion, in-flight peanut-allergic reactions continue to be problematic. On-board tree nut reactions are an emerging source of concern compared with a previous study. Individuals continue to fly commercially despite these allergies. Epinephrine is underadministered despite being available on 100% of flights. Despite restricted distribution by several major airlines, allergic

reactions to peanut continue to occur. Therefore, there is still a considerable educational gap that remains in keeping patients with peanut and tree nut allergy safe while flying.

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