

Peanut and tree nut allergic reactions in restaurants and other food establishments

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Background: The clinical features of food-allergic reactions in restaurants and other food establishments have not been studied. Of the registrants in the United States Peanut and Tree Nut Allergy Registry (PAR), 13.7% have reported reactions associated with such establishments.

Objective: The purpose of this study was to determine the features of allergic reactions to peanut and tree nut in restaurant foods and foods purchased at other private establishments (eg, ice cream shops and bakeries).

Methods: Telephone interviews were conducted through use of a structured questionnaire. Subjects/parental surrogates were randomly selected from among the 706 PAR registrants who reported a reaction in a restaurant or other food establishment.

Results: Details were obtained for 156 episodes (29 first-time reactions) from 129 subjects/parental surrogates. Most reactions were caused by peanut (67%) or tree nut (24%); for some reactions (9%), the cause was a combination of peanut and another nut or was unknown. Symptoms began at a median of 5 minutes after exposure and were severe in 27% of reactions. Overall, 86% of reactions were treated (antihistamines, 86%; epinephrine, 40%). Establishments commonly cited were Asian food restaurants (19%), ice cream shops (14%), and bakeries/doughnut shops (13%). Among meal courses, desserts were a common cause (43%). Of 106 registrants with previously diagnosed allergy who ordered food specifically for ingestion by the allergic individual, only 45% gave prior notification about the allergy to the establishment. For 83 (78%) of these 106 reactions, someone in the establishment knew that the food contained peanut or tree nut as an ingredient; in 50% of these incidents, the food item was "hidden" (in sauces, dressings, egg rolls, etc), visual identification being prevented. In 23 (22%) of the 106 cases, exposures were reported from contamination caused primarily by shared cooking/serving supplies. In the remaining 21 subjects with previously diagnosed allergy, reactions resulted from ingestion of food not intended for them,

ingestion of food selected from buffet/food bars, or skin contact/inhalation (residual food on tables, 2; peanut shells covering floors, 2; being within 2 feet of the cooking of the food, 1).

Conclusions: Restaurants and other food establishments pose a number of dangers for peanut- and tree nut-allergic individuals, particularly with respect to cross-contamination and unexpected ingredients in desserts and Asian food. Failure to establish a clear line of communication between patron and establishment is a frequent cause of errors. (*J Allergy Clin Immunol* 2001;108:867-70.)

Key words: Peanut, tree nut, allergy, restaurant

Food-allergic individuals must constantly guard themselves against accidental exposures, a feat that can be particularly difficult when food is being prepared outside the home by individuals who might not be familiar with the nuances of food allergy. Although accidental exposure to any allergenic food can occur in these settings, for several reasons attention is frequently focused on peanut (PN) and tree nut (TN). Allergy to PN or TN (or both) is common, being reported by 1.1% of the US population.¹ Reactions can be severe,² and they account for the majority of deaths reported from food allergy.³⁻⁵ Finally, these allergies affect individuals of all ages¹ and are usually permanent.⁶⁻⁸

The present study was undertaken to characterize the features of food-allergic reactions to PN/TN in restaurants and other food establishments. We have maintained a voluntary, self-report registry of PN- and TN-allergic individuals, the US Peanut and Tree Nut Allergy Registry (PAR),⁹ and we previously reported that 13.7% of registrants reported reactions in restaurants or other food establishments.

In the present study, we evaluated a randomly selected group of registrants who experienced reactions to PN, TN, or both in restaurants or other food establishments. A detailed questionnaire was administered by telephone to determine characteristics of the reactions, allergy histories, and responses of subjects and families to the allergic reactions.

METHODS

At the time of this study, there were 5149 persons registered in the PAR database. Briefly, this is a database maintained in conjunction with the Food Allergy and Anaphylaxis Network (located in Fairfax, Va), a lay organization that provides educational materials for individuals and families with food allergies. The database contains the results of surveys returned by individuals (or parental surrogates) with self-reported PN or TN allergy.⁹ The registrants were recruited through membership in the Food Allergy and Anaphylaxis Network and through questionnaires given to patients from allergists. Registrants included in this study were randomly selected

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The PAR has been supported by the Food Allergy and Anaphylaxis Network; the American Academy of Allergy, Asthma and Immunology; Dey; the Finkelstein family; and the Food Allergy Research and Resource Program (FARRP) of the University of Nebraska-Lincoln. This study (grants to S.H.S.) was supported in part by Mount Sinai Children's Center Health Research Center Award HD28822-08 and K23 AI 01709-01.

Received for publication June 28, 2001; revised July 27, 2001; accepted for publication July 31, 2001.

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0091-6749/2001 \$35.00 + 0 1/87/119157

doi:10.1067/mai.2001.119157

Abbreviations used

PAR: United States Peanut and Tree Nut Allergy Registry
 PN: Peanut
 TN: Tree nut

from among 706 registrants (13.7% of the total) who indicated that an allergic reaction to PN or TN had occurred in a food establishment (restaurant, fast-food establishment, take-out food establishment, bakery, ice cream shop); the aim was to collect more than 150 episodes for descriptive analysis. These registrants (or parental surrogates) were interviewed for this study by telephone through use of a structured questionnaire (69 questions) to obtain more details about the reactions. Informed consent was obtained from all participants, and the study was approved by the Mount Sinai Institutional Review Board.

Definition of reaction severity

Reaction severity was graded as previously described¹⁰:

- *Severe*: (a) hypotension, (b) wheezing with evidence of hives or diarrhea/vomiting, or (c) significant involvement of 3 organ systems
- *Moderate*: (a) wheezing alone or (b) significant involvement of 2 organ systems
- *Mild*: (a) significant skin or gastrointestinal symptoms either alone or in combination with mild symptoms in other systems or (b) any combination of mild symptoms.

Symptoms considered *significant* included the following: hives, hypotension, loss of consciousness, dyspnea, vomiting, diarrhea, throat tightness, coughing, and wheezing. Symptoms considered *mild* included erythema, pruritus, conjunctivitis, abdominal pain, nasal congestion, itchy throat, and sneezing. *Skin symptoms* were hives, edema, pruritus, atopic dermatitis, and conjunctivitis; *respiratory symptoms* were throat tightness, dyspnea, wheezing, chest tightness, coughing, and nasal congestion; *gastrointestinal symptoms* were mouth/tongue pruritus, nausea, abdominal pain, vomiting, and diarrhea.

RESULTS**Subjects and reactions**

From the 706 PAR registrants who indicated an allergic reaction associated with a food establishment, a random group of 129 registrants were interviewed. These registrants (or parental surrogates) described 156 reactions. For 29 reactions, the exposure was the first reaction to PN/TN; the remainder of the subjects had already experienced reactions to these foods and were actively avoiding them. Allergy to TN/PN had been physician-diagnosed in 99% of the registrants; 89% of them had undergone testing (RAST or skin prick test) that yielded results positive to the incriminated foods in all patients tested. The median age of the registrants at the time of the food establishment reaction was 6 years (mean, 12.8 years; range, 1.7-61 years). The responsible food was identified as PN in 67%, as TN (eg, walnut, cashew, almond, and hazel) in 24%, and as unknown/unspecified nut or a combination that included PN in 9%.

Reactions developed at a median of 5 minutes after exposure. Reaction severity was distributed as follows:

mild, 47%; moderate, 26%; severe, 27%. Forty-seven percent of those reacting experienced symptoms outside the establishment; this number was impacted by the fact that 36% of episodes were caused by foods purchased for consumption outside the establishment (primarily ice cream shops, bakeries, and Asian food establishments). Of those who developed symptoms while at a restaurant ($n = 82$), 26 (32%) received medication in the restaurant (epinephrine, 6; antihistamines, 18; inhaled β -agonist, 4). Ultimately, 86% of the reactions were treated with medications (86% with antihistamines, 40% with epinephrine). Reactions were triggered after ingestion in all but 5 of the episodes reported. In 2 cases, exposure occurred from PN shells that were being used as floor decoration; in 2 cases, there was skin contact with residual foods on the table; in 1 case, proximity to frying with PN oil was reported.

Features of food establishments and types of problems

The distribution of types of food establishments is shown in Fig 1. Asian restaurants and dessert shops were particularly problematic among the various types of restaurants and specialized cuisine establishments. With respect to which part of a meal caused the reaction, dessert was the most common source of exposure (43%), followed by entree (35%), appetizer (13%), and other (9%).

A variety of problems led to exposure to PN/TN. In 29 (19%) of 156 cases, the allergy was undiagnosed at the time and avoidance was not being undertaken. Of the remaining 127 episodes, 106 involved food ordered for the registrant through establishment personnel. In only 48 (45%) of these 106 cases was the restaurant alerted about the allergy in advance. Forty-one registrants spoke to a waiter and 9 to a chef; 3 families showed written instructions. Examples of errors made despite warnings are shown in Table I. Among those who did not notify the restaurant, various assumptions were made by the subject/family regarding the safety of the food (food intrinsically safe, allergy not so severe, visual inspection adequate, and so forth); in 3 cases the family simply forgot to mention the allergy, and in 1 case a grandparent had not been instructed about notification.

In 83 (78%) of the 106 episodes, the episode was caused by a food that was known by someone in the establishment to contain PN or TN as an ingredient. In 50% of these incidents that were caused by foods known to have PN/TN, the food item was "hidden" in a sauce, dressing, or egg roll, visual identification of PN/TN by the subject thus being prevented. In the remaining 23 episodes (22%), mistakes were reported from contamination caused primarily by shared ice cream equipment and cooking/serving supplies. For subjects with previously diagnosed allergy involving foods not obtained by ordering ($N = 21$), reactions were caused by foods selected from buffets/food bars, by food from the plate of a dining companion, or by skin contact/inhalation (as described above). In 1 case, an unsafe food was given directly to the child by bakery personnel as a free sample.

In response to these episodes, families altered their approach to restaurants and other food establishments in

a variety of ways, including the following: always carrying medications (91%), avoiding specific types of restaurants (89%), asking more questions (84%). Interestingly, 19% reported that they would reduce their frequency of eating out.

DISCUSSION

To our knowledge, this is the first comprehensive report of food allergic reactions in restaurants and other food establishments. The seriousness of the problem was reflected in a recent report of fatal food-induced anaphylaxis: 10 (31%) of 32 fatalities occurred in association with foods from restaurants or other food establishments, and all were from PN/TN.⁵ In the present study, we focused on allergy to PN/TN and used the PAR database to administer a structured questionnaire to learn more about allergic reactions in these settings. We found that reactions are frequently attributed to dessert foods (eg, cakes and ice creams) containing PN/TN, often in “hidden” forms (such as sauces or ingredients in food). In addition, Asian restaurants and take-out dessert stores (bakeries, ice cream shops) were common sources of foods that triggered reactions. Cross-contamination during preparation/serving was an important source of errors. Perhaps most importantly, the establishment was often (62% of the time) not properly notified of the allergy.

There are 2 limitations to this study. The first concerns the use of self-reporting of reactions, which is potentially impacted by recall bias and errors in diagnosis. Although it is difficult to assess the degree of such impact, we believe that it is generally small (< 15%) because, unlike the evaluation of food allergy in chronic disease (eg, atopic dermatitis), histories of acute severe reactions to PN and TN tend to be reliable.^{1,2} In addition, this patient group reported physician verification of their allergies (99%). The second limitation of the study is that only PN and TN allergies were considered. Although these are major allergens that account for persistent allergy and a majority of severe food-allergic reactions, the nuances concerning the pitfalls of eating in restaurants for those with other food allergies were not determined. In fact, one might expect that a child with egg, milk, wheat, or soy allergy would have an extremely difficult time avoiding these nearly ubiquitous foods, which lend themselves to being used as “hidden” ingredients and cross-contaminants in such settings.

Despite this second limitation, there are a large number of results from this study that should apply equally well to any food-allergic patron in any food establishment, in addition to the information of particular relevance to PN/TN allergy. From the patrons’ perspective: they must clearly identify themselves (or their affected children) as food-allergic. This is in contrast to merely asking whether the meal or food product in question contains the allergenic ingredient, inasmuch the establishment’s staff might be less diligent if they perceived the inquiry to be related to taste preference rather than health. Patrons might wish to call ahead and to provide

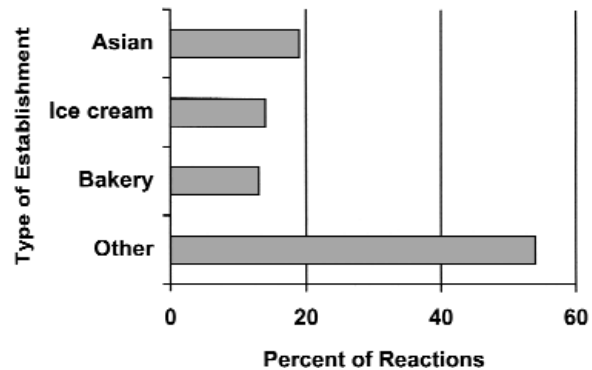


FIG 1. Type of establishment. “Other” includes establishments serving various specialized cuisines (Italian, Mexican, Continental, fast food, etc).

TABLE I. Examples of errors made despite warnings

Consumption of foods containing PN/TN
Pie crust with walnuts embedded
Ice cream cone “face” with peanut candy “eyes”
Egg roll closed with peanut butter
Asian food sauce containing peanut
Pesto (pine nut) sauce within sandwich
Muffin with nuts
Garnish containing walnut
Salad dressing with nuts
Contamination by PN/TN
Jelly sandwich/jelly jar was contaminated with peanut by shared utensil
Ice cream scoop was previously used for nut ice cream
Ice cream was contaminated with 1 peanut candy mixed from toppings bar
Server sprinkled nuts on another dessert, then handled cookie

written materials explaining their allergies, and they must always be certain that they are communicating with the appropriate personnel—ie, with those who are involved in the preparation and serving of the food—so that the instructions can be followed correctly. Information about the amount of food that could trigger a reaction (trace amounts) and the issues of cross-contamination should be discussed. It might be safer to limit menu items to those less likely to contain the causal food proteins. Simple dishes without sauces or multiple mixed ingredients might be safer than foods such as stews, and for PN/TN allergic patients, baked desserts and ice creams appear to be considerably risky. Because of cross-contamination, items taken from buffets/food bars can pose additional risks. If a mistake is made, the allergic patron might do well to keep the dish at the table until a newly prepared one arrives (to discourage the establishment from simply scraping off the allergen). Finally, the patron must feel comfortable that the restaurant staff has understood the instructions and properly addressed the patron’s concerns; otherwise, he or she should not continue the meal. These educational issues should be part of anticipatory guidance in clinical interactions with food-allergic patients. Educational materials are available through the

Food Allergy and Anaphylaxis Network (telephone, 800-929-4040; Web site, www.foodallergy.org).

Restaurants and other food establishments must be sensitive to the needs of individuals with food allergy. Procedures should be in place to manage food-allergic patrons. Personnel should receive training about food allergy, the potential for trace protein contamination to trigger reactions, methods by which to avoid cross-contamination, and the means of activating emergency assistance in the event of a reaction. A clear line of communication among patron, server, and food preparer must be established and maintained. Menus should specify the ingredients in the establishment's foods—eg, apple pie *with walnuts*, salad greens *with pine nuts*. Personnel might suggest particular meals or foods that could be prepared safely. In addition, food preparers should be advised about the potential for cross-contamination (sharing of fryers/blenders/utensils/mixers/pans/grills and contamination by garnishing bars, hands, and gloves) and methods of avoiding this problem (use freshly cleaned, separate equipment; change gloves). If a mistake is made, the cook should prepare a new dish rather than try to remove/wipe off the allergen. Finally, potent allergens should not be used for decorative purposes (eg, PN shells on the floor).

In summary, patients with PN/TN allergies are faced with a number of challenges when eating in restaurants and other food establishments. Although particular types of cuisine (eg, Asian) and particular types of foods (eg, baked

goods and ice creams) pose particular risks and although cross-contamination of foods is a problem, mistakes can also stem from a lack of clear communication between patron and staff. Further studies will be needed to identify particular issues for patients with allergies to other foods.

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