

Peanut oil is not allergenic to peanut-sensitive individuals

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Ten peanut-sensitive patients were enrolled in a double-blind crossover trial to determine whether ingestion of peanut oil can induce adverse reactions in such individuals. All patients had experienced prior allergic reactions to peanut ingestion, including any of the following: generalized urticaria, angioedema, abdominal cramps, vomiting, diarrhea, bronchospasm, or shock. All patients had elevated levels of serum IgE antibodies to both crude peanut extract and the purified peanut allergen, Peanut-I, by RAST assay; binding values ranged from 2 to 26 times that of negative control serum. All patients demonstrated negative puncture skin tests to both peanut oil and olive oil (control). At 30-min intervals, patients ingested 1, 2, and 5 ml of either oil contained in 1 ml capsules while under constant observation. These quantities exceed the maximum estimated dose of peanut oil that would occur in single meals. Patients returned 2 wk later for ingestion challenge with the remaining oil. No untoward reactions were observed with either peanut oil or olive oil. Peanut oil ingestion does not pose a risk to peanut-sensitive individuals. (J ALLERGY CLIN IMMUNOL 68:372, 1981.)

Peanuts are a frequent source of food allergies.¹⁻⁷ These hypersensitivity reactions can range from mild abdominal discomfort to severe, life-threatening anaphylactic shock. The frequency of allergic reactions to peanuts is noted in a number of studies. In 81 children and adolescents, ages 3 to 16 yr, with a history of food-associated allergy, May and Bock¹ diagnosed 17 (21%) of these patients as being allergic to peanuts by double-blind food challenges. In that study, peanuts gave the highest percentage of positive responses. In addition, Aas⁷ found 16 of 84 allergic

children to have a positive immediate skin-test response and elevated IgE antibody levels by RAST to peanut extracts. Peanuts were also found to be one of the few foods eliciting hypersensitivity reactions in infants up to 3 yr of age.² The relative frequency of peanut hypersensitivity is noted by other investigators³⁻⁶ as well as the potential severity of these reactions.⁸

Until recently, little had been done to isolate and identify the allergen in peanuts responsible for allergic reactions. Sachs et al.⁹ have isolated the major allergen of peanuts. This major allergen (Peanut-I) and several minor allergens were shown to be proteins. Their observations greatly enhance the ability to detect the presence of peanut allergen in other food sources.

Critical in the prevention of these hypersensitivity reactions is adequate labeling to identify the presence of potential allergens in foods. As a result, it is proposed that source labeling of fats and oils be required on food packages.¹⁰ Rationale for this proposal is based on potential risks of allergic reactions to edible oils in individuals hypersensitive to the parent product. Many believe peanut oil is a source of allergen to the peanut allergic patient. However, the allergenicity of peanut and other edible oils is based largely on testimonial evidence. Peanut oil does not contain de-

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Abbreviation used

RAST: Radioallergosorbent test

tectable levels of protein¹¹ and is therefore a highly unlikely source of danger to the peanut-hypersensitive patient. In this study, we attempt to confirm this hypothesis by challenging with peanut oil 10 patients with histories of peanut allergy/anaphylaxis.

MATERIALS AND METHODS

Patients

Ten patients with histories of immediate hypersensitivity reaction to the ingestion of peanuts were recruited from the Allergy Clinics at the University of Wisconsin, Madison, and the Mayo Clinic, Rochester, Minn. All patients had an immediate wheal and flare response to either a skin-puncture test with crude peanut extract (1:20 w/v; Greer Laboratories, Lenoir, N.C.) or to a puncture test with crude peanut extract prepared in the Allergic Diseases Research Laboratory at Mayo Clinic (100 ng/ml to 1 µg/ml).¹² All patients had elevated serum IgE antibody levels to peanut allergens by RAST¹³; binding values to crude peanut extract ranged from 2 to 26 times that produced by serum from a nonallergic person, and RAST binding to Peanut-I was 2 to 11 times that of the negative control serum for nine of the 10 patients. No increase in IgE antibody to Peanut-I was seen in the remaining patient. One year previous to this study, this patient's serum had a RAST binding value of 6 times that of negative control serum. A clinical summary of these 10 patients is provided in Table I.

Challenge materials

The peanut oil was Planters peanut oil, a product of Standard Brands, Inc. The olive oil was Pompeian imported virgin olive oil distributed by Pompeian, Inc. Both oils were obtained at a local supermarket. Olive oil was chosen as the placebo because it is also an edible oil, allergic reactions to olives are rarely reported, testimonial reports of allergic reactions to olive oil have not occurred, and olive oil is generally considered to be a nonallergenic food.¹⁴

The oils were placed in gelatin capsules (1 ml/capsule) and frozen. The capsules were administered to the patients while still in the frozen state to mask the distinctive flavors associated with the small amounts of peanut oil and olive oil that occasionally coated the outer surface of the capsules. The capsules were placed in coded jars so that neither the patient nor the physician knew which material was being administered.

Challenge test

The double-blind crossover trial was conducted on two separate days. On the first day, puncture skin tests were performed with peanut oil and olive oil. If the skin tests to both antigens were negative, the oral challenge phase of the study was initiated. On the first day, certain randomly se-

lected patients received peanut oil and the remainder received the placebo, olive oil. The doses were administered in a sequential manner of 1, 2, and 5 ml of the oil (1, 2, or 5 capsules) followed by a 30-min observation period for each challenge dose. The second phase of the study was always conducted at least 14 days after the first phase. Those patients that received peanut oil in the first challenge received the olive oil on the second day and vice versa. The patients were under the close supervision of medical personnel throughout the challenge periods. The trials with any patient would have been terminated at the earliest sign of any adverse reaction. None of the patients took any drugs within 24 hr of the challenge periods. This study was approved by the Committee for the Protection of Human Subjects at both the University of Wisconsin and the Mayo Clinic.

RESULTS

Peanut oil and olive oil did not elicit any wheal and flare response in the skin-puncture tests with any of the 10 patients. None of the 10 patients experienced untoward reactions upon challenge with either peanut oil or olive oil in quantities of 1, 2, or 5 ml. Neither immediate nor delayed responses were observed with either oil. Although all of the patients had substantial histories of adverse reactions after the ingestion of peanuts, none of the patients developed any of their typical symptoms or any other symptoms during the course of this challenge study.

DISCUSSION

The results of this double-blind crossover trial clearly indicate that peanut oil is not allergenic to peanut-sensitive individuals. Individuals with peanut hypersensitivity do not need to eliminate peanut oil from their diets. In managing the peanut-sensitive individual, usual and reasonable advice has been to avoid peanuts and other potential sources of the allergen. This warning has commonly included an avoidance of peanut oil. However, based on the results of this study, it is not necessary to eliminate or restrict the use of peanut oil by peanut-sensitive individuals. Undue restriction of the allergic patient's diet is not only confusing to the patient but also raises unwarranted and unnecessary anxiety.

All our patients had convincing histories of immediate hypersensitivity reactions to peanuts with confirmation of IgE sensitivity by RAST and immediate skin-test response to a peanut extract. We did not elicit a positive skin-test response to peanut oil in any of these 10 patients. Nor did we evoke an untoward reaction upon oral challenge with peanut oil in doses up to 8 ml. This dose is a reasonable challenge quantity to assume confirmation of this fact. Peanut oil is used primarily for stir-frying, and the ingestion of 8 ml of oil probably exceeds the amount that would

TABLE I. Clinical summary of patients

Patient No./Sex/Age	Atopic history	Age of onset of peanut sensitivity/years since last exposure	Reaction after peanut ingestion	Skin test to peanut extract*	RAST (% counts bound)†	
					Crude peanut	Peanut-I
1/F/21	AR	2/3	AE, D, H, L, V	2+	2.30	2.70
2/M/17	BA	Childhood/2	AE, N, V	2+	29.49	27.23
3/F/45	—	12/2	BA, H, U	2+	3.47	6.61
4/M/23	AR, BA	18/1	BA, H, U	3+	28.61	27.14
5/M/20	—	2/3	AE, BA, H, L	2+	21.40	18.08
6/M/24	AR, BA	Childhood/0.3	AE, BA, U, V	3+	29.70	25.82
7/M/33	—	Infancy/1.5	AE, BA, L, U	3+	32.69	26.60
8/F/22	—	Childhood/2	E, U	2+	30.79	29.39
9/M/30	—	Childhood/2	U	2+	27.77	23.57
10/M/32	—	5/5	U	3+	31.62	29.88

AR = allergic rhinitis; BA = bronchial asthma; AE = angioedema; D = diarrhea; E = erythema; H = hypotension; L = laryngeal edema; N = nausea; U = urticaria; V = vomiting.

*Patients 1 and 2 were tested by puncture technique with peanut extract at 1 µg/ml or 100 ng/ml, respectively; patients 3 through 10 were tested by prick technique with peanut extract 1:20.

†Serum from a nonallergic person bound 1.25% total counts and 2.69% total counts, respectively, in the crude peanut RAST and Peanut-I RAST.

be acquired in peanut oil-containing meals. This also probably exceeds the amount of oil that would be ingested even in meals where peanut oil was used for deep-fat frying. Consequently, the results of this study should be relevant to practical usage levels of peanut oil.

Our findings are also of importance in consideration of changes in food labeling regulations. Food labels serve an important function to food-hypersensitive individuals because they provide the mechanism for determining whether the food should be avoided. In the case of edible oils, labeling the source of the oil for the benefit of the allergic patient would be useful only if the oil contained the allergen and elicited allergic responses. In the case of peanut oil there is no evidence to indicate any potential danger to the peanut-sensitive consumer. Consequently, changes in the food labeling regulations that require source labeling of fats and oils, if based solely on the risk of allergic reactions to certain oils, may not be warranted. Our results pertain only to peanut oil. However, like peanut oil, soybean oil, coconut oil, and herring oil do not contain protein.¹¹ However, confirmation that these and other edible oils are nonallergenic awaits future double-blind challenge testing.

The results of this study were obtained with one sample of peanut oil. Certainly, the argument could be made that this sample of oil was not representative and that some samples of oil might contain peanut protein residues. However, virtually all of the peanut oil sold for both commercial and domestic uses in this country is processed by one manufacturer. Consequently, all peanut oil receives an identical processing

treatment. The manufacturer (Standard Brands, Inc.) indicates that peanut oil has a very consistent proximate composition: 100% fat with no detectable protein, carbohydrate, water, ash, or fiber and only trace amounts of minerals. Occasionally, peanut oil might be contaminated with peanut protein during use in restaurants or homes. If the oil is used to fry a product containing peanuts, then the oil would likely retain some peanut protein. Subsequent use of such peanut oil for the frying of other foods, whether or not they contain peanuts, might present a hazard to peanut-hypersensitive individuals.

There may be significant differences in the allergenicity of various foods prepared from a common source. Processing and preparation conditions may remove or destroy the allergen, and the prepared food may pose no risk to hypersensitive individuals. In the case of peanuts, the lack of allergenicity of peanut oil may be the exception rather than the rule. Clinical experience and patient histories would strongly suggest that most peanut products such as roasted peanuts and peanut butter are allergenic. However, a number of new peanut products have recently been developed,¹⁵ and their potential for eliciting adverse reactions among peanut-sensitive patients remains to be determined.

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