

Cashew Allergy Compared to Peanut Allergy in a US Tertiary Care Center

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Background: International literature has shown an increased incidence of cashew allergy with a higher propensity toward severe reactions such as anaphylaxis. The clinical characteristics of cashew allergy compared to peanut allergy in a US center have not been reported.

Objective: To describe the clinical characteristics of cashew allergic patients compared to peanut in a US tertiary care center.

Methods: A retrospective chart review and a phone survey were conducted to identify the clinical characteristics of cashew allergic patients in comparison to peanut allergic patients in a US tertiary care center. Cashew and peanut allergic patients were selected based on documentation or history of clinical allergy by questionnaire and chart review and positive specific IgE (>0.35 kU/L). Age at exposure, quantitative serum IgE, clinical presentation characteristics, and atopic history were recorded.

Results: In our center, patients with cashew allergy were more likely to experience anaphylaxis ($P < 0.05$) and less likely to have atopic dermatitis ($P < 0.04$) than peanut allergic patients. Anaphylaxis was present in 50% of cashew and 25% of peanut allergic patients. The most common symptom at presentation was cutaneous involvement (69%). Respiratory symptoms were experienced among 50% of cashew allergic subjects. Asthma, allergic rhinitis, and concomitant food allergy were similar in both groups.

Conclusions: This study includes the first direct comparison of anaphylaxis in a cohort of cashew allergic patients compared to peanut allergy in a US tertiary care center. Cashew allergy resulted in more severe allergic reactions compared to peanut in this US center. Since cashew allergic reactions are more likely to result in anaphylaxis, patients and their parents should be educated on the correct use of the epinephrine auto-injector and practice strict tree nut exposure avoidance.

Introduction

ALLERGY TO PEANUTS AND tree nuts are especially concerning due to the severity of symptoms and risk of death. Allergy to peanuts, tree nuts, or both has an estimated prevalence of 1%–2% and affects $>3\%$ of households in the United States.¹ Peanut allergy is more common than tree nut allergy and, therefore, more published data are available to describe its natural history, diagnosis, and treatment. Considerably less is known about other specific tree nut allergies.

After walnuts, cashew allergy is the next most commonly reported tree nut allergy.¹ International reports document a higher incidence of anaphylaxis to cashew compared to peanuts.^{2–5} Cashew can be found in butters, natural and artificial flavorings, pesto, bakery items, and other confectionary products. Cashew butter has been used as a substitute for peanut butter in many European countries.⁴

It is important for clinicians to understand the risks of cashew allergy due to the increased incidence and risk of severe symptoms. This observational study was performed to further characterize the presentation of cashew allergy in a large tertiary care center in the United States and compare children with cashew allergy to those with peanut allergy.

Patients and Methods

A search of the Texas Children's Hospital (TCH) laboratory database (OASIS) was conducted to identify patients likely to have cashew allergy; for example, individuals with a positive specific IgE (defined as >0.35 kU/L) to cashew nut within the previous 7 years were identified. In addition, clinical records were reviewed to identify cashew/peanut allergy in patients seen in the TCH Allergy and Immunology

Clinic (~5,000 annual outpatient visits). Telephone surveys were attempted on all potentially eligible cashew allergic subjects identified to evaluate demographics, clinical presentation, treatments, and concomitant atopic diseases if this information was not included in the medical record. Consent to participate was obtained at the start of the call. The Baylor College of Medicine Institutional Review Board reviewed and approved all study procedures. For this study, allergy was defined by symptoms after the ingestion of the food with evidence of measurable specific IgE (Table 1). The symptoms experienced by the subjects after food ingestion, or clinical reactivity, were determined by chart review and/or phone interview. Sensitization was defined by the presence of food-specific IgE without clinical reactivity upon food exposure.

Anaphylaxis was defined as described in the Second Symposium on the Definition and Management of Anaphylaxis.⁶ Symptoms of anaphylaxis reported by patients were defined as: respiratory, if the symptoms were wheezing, shortness of breath, or throat tightness; cutaneous, if symptoms were hives, itching, or rash; digestive, if nausea, vomiting, diarrhea, or upset stomach was reported; ocular, if pruritus, swelling, or tearing was noted; and cardiovascular, if low blood pressure, loss of consciousness, or inability to respond to stimulation occurred.

Age at exposure and IgE (after log transformation) were compared in cashew and peanut allergic groups by *t*-test. Chi-square test and Fischer's exact test (for small sample size) were used for categorical variables. Two-sided *P* value <0.05 was reported to be statistically significant. All statistical analyses were performed using SPSS version 17.0.

Results

Forty-two potentially eligible cashew allergic subjects were identified. Twenty four were contacted by telephone and all consented to participate. All subjects were contacted within 5.2 years of presentation. Sixteen patients were determined to have cashew allergy and 76 patients had peanut allergy as defined by clinical reactivity and symptoms. The average age of reactions for cashew allergic patients was 3.5 years compared to 2.4 in peanut allergy (Table 2). Sixty-three percent of cashew allergic patients (*n* = 10) and 58% of peanut allergic patients were males (*n* = 44). Age at exposure, total IgE, specific IgE, and gender were not significantly different for cashew versus peanut allergic subjects. Mean cashew-specific IgE level was 23.3 kU/L and mean peanut-

specific IgE level was 31.5 kU/L. The most common symptom at presentation was cutaneous involvement with 72.4% (*n* = 11) of cashew allergic patients and 93% (*n* = 55) of peanut allergic patients reporting hives, itching, or rash (Table 2). There was a tendency toward greater rates of cutaneous involvement in peanut allergic subjects (*P* = 0.09). Fifty percent of the cashew allergic patients experienced respiratory symptoms (*n* = 8) compared to 32.6% (*n* = 21) in the peanut allergic patients and rates were not significantly different between groups (*P* = 0.21). Nineteen percent of cashew allergic subjects reported gastrointestinal symptoms (*n* = 3) compared to 11.6% (*n* = 8) in the peanut allergic patients and there was a trend toward statistical significance (*P* = 0.06). No subjects reported cardiovascular symptoms in either group.

Anaphylaxis to cashew, as defined by the Second Symposium on the Definition and Management of Anaphylaxis,⁶ was present in 8 cases (50%). Only 30% of peanut allergic patients met the criteria for anaphylaxis. In the review of cashew (*n* = 16) and peanut allergic patients (*n* = 76), those with cashew allergy were more likely to experience anaphylaxis (*P* < 0.05) and have lower rates of atopic dermatitis (*P* = 0.036) than those with peanut allergy (Table 2). Fifty percent of our cashew allergic patients had atopic dermatitis (*n* = 8) compared with 78% of peanut allergic patients. Sixty-nine percent of cashew allergic subjects had allergic rhinitis (*n* = 11) versus 71% in the peanut allergic group and 63% had asthma (*n* = 10) versus 53% in the peanut allergic group with no statistical significance between groups for either condition. Seventy-five percent (*n* = 12) had cashew allergy and sensitization to another food, while 87% of peanut allergic patients had other food sensitization. Concomitant cashew and peanut allergy were noted in 9 patients and these patients were only included in the cashew allergic group. There were a total of 85 peanut sensitized patients in both the cashew and peanut allergic groups.

Fifty-eight percent (*n* = 14) of cashew allergic patient telephone respondents reported an immediate clinical reaction to cashew with only one reaction occurring >1 h after contact. Cashew allergic phone survey respondents reported treatment with antihistamines (*n* = 16, 100%), epinephrine (*n* = 8, 50%), and systemic steroids (*n* = 5, 36%) after an acute reaction. All but one patient either already had a prescription because of a prior food allergy diagnosis or were prescribed an epinephrine auto-injector after their reaction to cashew. Ninety-six percent (23/24) had unexpired epinephrine auto-injectors at the time of the survey.

TABLE 1. ELIGIBILITY CRITERIA FOR CASHEW AND PEANUT ALLERGIC SUBJECTS

<i>Clinical history</i>	<i>History of symptoms occurring within 4–6 h of eating a cashew or peanut containing food</i>
Symptoms classic for immunoglobulin E (IgE)-mediated food allergy	Respiratory: Wheezing, shortness of breath, or throat tightness Cutaneous: Hives, itching, or rash Digestive: Nausea, vomiting, diarrhea, or upset stomach Ocular: Eye pruritus, swelling, or tearing Cardiovascular: Low blood pressure, loss of consciousness, or inability to respond to stimulation
Specific IgE testing	Food-specific IgE > 0.35 kU/L and/or positive skin prick testing (wheal >3 mm above negative control)

TABLE 2. COMPARISON OF CASHEW AND PEANUT ALLERGIC PATIENTS

	Cashew allergy	%	Peanut allergy	%	P value
Gender					
Male	10	62.5	44	57.9	NS
Female	6	37.5	32	42.1	NS
Age at exposure (year)					
Mean	3.5		2.4		NS
Mean IgE Level (IU/mL)	3,324		1,853		NS
Mean cashew IgE (kU/L)	23.3				
Mean peanut IgE (kU/L)			31.5		
Clinical signs					
Respiratory	8	50.0	21	32.6	NS
Cutaneous	11	72.4	55	93.0	0.090
Digestive	3	18.8	8	11.6	0.055
Eye symptoms	3	18.8	7	14.0	NS
Anaphylaxis	8	50.0	19	30.2	0.049
Atopic diagnoses					
Atopic dermatitis	8	50.0	59	77.6	0.036
Asthma	10	62.5	40	52.6	NS
Allergic rhinitis	11	68.8	54	71.1	NS
Other food allergy	12	75.0	66	86.8	NS
Total patients	16		76		

Abbreviations: IgE, immunoglobulin E; NS, not significant.

Discussion

Of the patients with cashew and/or peanut allergy who presented to our TCH specialty clinic and hospital over a 7-year period, 17.4% (16/92) had allergy to cashews. This is only slightly higher than the prevalence in Australian cohorts (13% [27/204])³ of peanut and cashew allergic patients. In 2003, a US cohort study showed increasing cashew allergy prevalence with 22% (36/166) of peanut and/or tree nut allergic individuals reporting cashew sensitization.¹ The characteristics of these patients were not described.

In this comparison of cashew and peanut allergic patients in a US tertiary care center, anaphylaxis was significantly more frequent in cashew allergic patients and gastrointestinal symptoms were more commonly noted in cashew allergy. This has also been described in Australian cohorts.² Cashew allergic patients at our center were less likely to have atopic dermatitis at presentation. The rate of atopic dermatitis in our peanut allergic patients is consistent with a recent retrospective study.⁷ In our cohort, the most common presenting symptom was cutaneous, which is similar to other studies of cashew allergic patients.^{2,3,5,8,9} Fleischer et al. evaluated all tree nut allergic patients and described patients with reaction upon oral challenge to cashew. In this report, cashew allergy reaction rates were similar to rates seen in all tree nut allergy with moderate to severe reactions noted in 69% of cashew allergic patients. Gastrointestinal symptoms were seen in 33% of tree nut allergic reactions and cutaneous reactions were most common in 84% of reactions.⁹ In our cohort, only 19% experienced gastrointestinal symptoms and 69% had cutaneous symptoms. This may reflect recall bias that is inherent in questionnaire administration for retrospective events. Fifty percent of patients in our cashew allergic cohort experienced anaphylaxis as the presenting symptom and this is consistent with previous observations.^{2,4,5} The

severity of anaphylactic reactions in our cohort may have minimized the recall bias.

Cashew allergic patients have similar rates of atopic disease as peanut allergic patients and this was seen in our cohort for asthma and allergic rhinitis. However, the rate of atopic dermatitis in our cohort was less than other reports at only 50% of cashew allergic patients. The rate of atopic dermatitis in our cashew allergic subjects was lower than in our peanut allergic patients. A French cashew allergic cohort reported by Rance et al.³ had lower rates of both allergic rhinitis (19%) and other food allergy (43%) compared to our US cohort. Clark et al.⁵ reported a higher percentage of asthmatics (92%) than in our US cohort. The proportion of allergic disorders seen in our population was roughly similar to those seen in Fleischer et al.,⁹ which suggests that the concomitant presence of allergic disorders does not differ significantly between cashew and other specific tree nut allergies in the United States.

A study of 74 peanut allergic patients with concurrent food allergies in France showed 40% incidence of concomitant cashew allergy.¹⁰ Our cohort had a much smaller incidence of concurrent peanut and cashew allergy at 10.6% (9 of 85 patients), but this may have underestimated the true incidence, given the retrospective nature of our study and the likelihood of tree nut avoidance in previously diagnosed peanut allergic patients. Other limitations of the study include the small patient population and the absence of a few data points for total IgE and specific IgE in patients who had a positive immediate hypersensitivity skin prick test to cashew or peanut. Another limitation in this retrospective study is the lack of standardization of physician symptom reporting in the medical record. The telephone questionnaire was used in an effort to minimize this limitation.

The treatment of anaphylaxis in the cashew allergic patients in our tertiary center, as assessed by phone survey,

was appropriate with the use of epinephrine. Sicherer et al. reported through a survey of patients with peanut and/or tree nut reactions that treatment for allergic reactions included antihistamines in 86%, epinephrine in 19%, steroids in 26%, and IV fluids in 9% of patients. Only 74% were later evaluated by a physician and only 46% of those children were prescribed epinephrine auto-injectors.¹ Our survey included only patients who received a diagnostic evaluation for their allergy. In our cohort, half of cashew allergic patients received epinephrine as a treatment and the vast majority had unexpired epinephrine auto-injectors at the time of survey. The increased awareness of nut allergy among patients and physicians may contribute to the findings of increased epinephrine use and current patient auto-injector possession in our center.

This study includes the first direct comparison of anaphylaxis in a cohort of cashew allergic patients compared to peanut allergy in a US tertiary care center. In this US tertiary care center, anaphylaxis to cashew was significantly higher than in patients with peanut allergy. Practitioners should be aware of the risk of severe reactions in cashew allergy.

Author Disclosure Statement

No competing financial interests exist for any of the authors.

Conflict of Interest: None for the above authors.

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