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The prevalence and characteristics of food allergy in urban minority children

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ABSTRACT

Background: Urban minority children are known to have high rates of asthma and allergic rhinitis, but little is known about food allergy in this population.
Objective: To examine the prevalence and characteristics of food allergy in an urban pediatric population.
Methods: A retrospective review of electronic medical records from children seen in the hospital-based general pediatric clinic at Mount Sinai Hospital serving East Harlem, NY, between July 1, 2008 and July 1, 2010 was performed. Charts for review were selected based on diagnosis codes for food allergy, anaphylaxis, or epinephrine autoinjector prescriptions.
Results: Of 9,184 children seen in this low-income, minority clinic, 3.4% (313) had a physician-documented food allergy. The most common food allergies were peanut (1.6%), shellfish (1.1%), and tree nuts (0.8%). Significantly more black children (4.7%) were affected than children of other races (2.7%, $P < .0001$), which consisted primarily of Hispanic and multiracial children. Anaphylaxis was most frequently documented for peanut (15.1%), fish (12.5%), and milk (11.1%). Among food-allergic children, asthma (50%), atopic dermatitis (52%), and allergic rhinitis (49%) were common. Fewer than half had confirmatory testing or evaluation by an allergy specialist, and although most had epinephrine autoinjectors prescribed, most were not prescribed food allergy action plans.
Conclusion: This is the largest study of food allergy prevalence in an urban minority pediatric population, and 3.4% had physician-documented food allergy. Significantly more blacks were affected than children of other races. Fewer than half of food-allergic children in this population had confirmatory testing or evaluation by an allergy specialist.

Introduction

Recent decades have witnessed an apparently increasing prevalence of food allergies. In a study that used several national health databases and health care surveys, the prevalence of food allergy in US children was found to be approximately 3.9%, an 18% increase in prevalence between 1997 and 2007.[1] Sicherer et al[2] reported that peanut and tree nut allergies in the United States had more than tripled from a similar timeframe. A more recent electronic survey indicates that 8% of US children have food allergy.[3] Serologic data from the National Health and Nutrition Examination Survey (NHANES) 2005–2006 found an estimated prevalence of clinical food allergy of 2.5%, although this study only examined immunoglobulin E (IgE sensitization to milk, egg, peanut, and shrimp rather than clinical reactivity to these foods.[4]

Recent large-scale epidemiologic studies suggest higher rates of food allergy in minority groups. Gupta et al[3] showed that the odds of food allergy were significantly higher among Asian and black children vs white children.[3] Serologic assessment of food allergy from the NHANES study also found that Black race was a risk factor for food allergy.[4] In addition, a study looking at food allergen sensitization in children from the National Cooperative Inner City Asthma Study, a majority black and Hispanic group, found that 45% of children with asthma had evidence of food allergen sensitization, with 19% having IgE levels at 50% or more of the positive predictive value for clinical reactivity to at least 1 food.[5] A recent study from a minority urban multiethnic birth cohort showed that self-reported black race and African ancestry were associated with an increased risk for food sensitization and a high likelihood for multiple food sensitizations.[6] Furthermore, a retrospective review of food allergy cases seen in an allergy clinic, which serves primarily Hispanic and black patients, found high rates of IgE sensitization to foods.[7] Although these studies suggest that minorities have higher rates of food sensitization, one must note that sensitization does not necessarily correlate with clinical disease.[8] Currently, few data

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specifically examine clinical food allergy in urban minorities. Thus, we sought to determine the prevalence and characteristics of food allergy in a general pediatric clinic that serves a low-income minority population.

Methods

Chart review methodology

A retrospective chart review of the electronic medical records from children ages 0 to 21 years attending the hospital-based general pediatric clinic at Mount Sinai Hospital (New York, New York) between July 1, 2008 and July 1, 2010 was performed. Charts with the diagnosis codes 693.1 (food allergy), v15.01 (personal history of allergy to peanut), v15.02 (personal history of allergy to milk products), v15.03 (personal history of allergy to eggs), v14.04 (personal history of allergy to seafood), v15.05 (personal history of allergy to other foods), 995 (anaphylaxis), or epinephrine auto-injector prescription were examined. Medical records were reviewed for data on demographics, food allergy history, other allergic history, and allergy test results (skin prick test [SPT] and serum specific IgE levels to foods). This study was approved by the Mount Sinai School of Medicine Institutional Review Board with a waiver of consent.

Definitions

Diagnostic algorithms were used to categorize patients into 4 groups. Group 1 was defined by a food-specific IgE level greater than 95% positive predictive value for that food (milk 15 kU/L, egg 7 kU/L, peanut 14 kU/L, tree nuts 15 kU/L,)[9,10] OR if there a history was present of clinical reaction in conjunction with positive testing (SPT $\geq$3 mm or food-specific IgE level $>$0.35 kU/L). For foods in which greater than 95% positive predictive values are not clearly established, the following criteria were used: fish or shellfish 20 kU/L, wheat 26 kU/L, soy 30 kU/L, other food 50 kU/L. Group 2 was defined by a history of convincing, immediate symptoms such as anaphylaxis, hives or urticaria, angioedema, trouble breathing, oral pruritus or throat closing, nausea, vomiting, or diarrhea where confirmatory testing was not available (SPT or specific IgE). Group 3 was defined by a history of positive testing (SPT $\geq$3 mm or food-specific IgE level $>$0.35 kU/L but $<$95% predictive value for a given food if known or $<$50kU/L) without a history of clinical reaction. Group 4 was defined by clear food allergy documentation in the medical history with nonspecific or unclear symptoms and a lack of confirmatory testing.

Anaphylaxis was defined as per national guidelines.[11] Cutaneous reactions were defined as urticaria, atopic dermatitis, or rash. Respiratory reactions were defined as cough, shortness of breath, wheezing, or nasal congestion. Gastrointestinal reactions were defined as nausea, vomiting, diarrhea, or oral pruritus.

Statistical analysis

Statistical analysis was performed with GraphPad (GraphPad Software, La Jolla, California). Comparison of categorical data was performed with Fisher's exact test with a 2-tailed *P* value, whereas comparison of continuous data was performed with a *t* test.

Results

Patient characteristics

Of the 9,184 children ages 0 to 21 years seen in this predominantly minority clinic (Table 1), most of the patients (89%) were insured with Medicaid/Medicaid managed care. The median age was 8 years, and 52% of patients were male (Table 1). The charts of 420 subjects met search criteria, and medical records were reviewed. A total of 107 charts were excluded, leaving 313 children with food allergy who were included in the final analysis. Sixty charts were excluded because the subjects had been evaluated by an allergist, and food allergy was ruled out. Thirty-three were prescribed an epinephrine autoinjector for non–food allergy reasons (ie, prescribed with palivizumab, insect allergy, allergic reaction of unclear etiology with no food allergy history), 13 subjects had been given a food allergy diagnosis code, but the medical record lacked any other documentation of food allergy or only had documentation of lactose intolerance, and one chart was given only a diagnosis code for anaphylaxis for unclear reasons and lacked any documentation of food allergy.

Table 1
Overall characteristics of patient population and characteristics of food allergic population

	N (%)
Total number of children (ages 0-21 yrs) seen in clinic during time period	9,184
Age	8 years[a]
Sex	
Males	4,741 (52%)
Females	4,443 (48%)
Race	
African American (black)	3,460 (37.7%)
Other (multiracial)	2,974 (32.4%)
Hispanic/Latino	1,932 (21.0%)
Caucasian (white)	430 (4.7%)
Unknown	184 (2.0%)
Asian	142 (1.5%)
Native American	57 (0.6%)
Pacific Islander	5 (0.1%)
Total no. of patients with any food allergy	313 (3.4%)
Total no. of patients with $>$1 food allergy	130 (1.4%)
Age at time of this study	7 yrs (1 yr to 21 yrs)[a]
Age at diagnosis of food allergy	1 yr (3 mo to 8 yrs)[a]
Sex	
Males	186 (59%)
Females	127 (41%)
Race	
African American (black)	161 (51%)
Hispanic	133 (43%)
Asian	5 (2%)
Caucasian	2 (1%)
Native American	2 (1%)
Other	10 (3%)
History of food-induced anaphylaxis	43 (13.7%)
Asthma	157 (50%)
No. of children with asthma seen in ED in the last year	41 (26%)
No. of children with asthma ever hospitalized for asthma	30 (19%)
Atopic dermatitis	164 (52%)
Allergic rhinitis	152 (49%)

[a]Median age with range.

Prevalence of food allergy

The prevalence of physician-documented food allergy in this population was 3.4%, and 1.4% of patients had multiple food allergies (Table 1). Overall, peanut allergy prevalence was the highest at 1.6%, followed by allergies to shellfish (1.1%), tree nut (0.8%), egg (0.8%), milk (0.5%), fish (0.3%), fruit (0.3%), soy (0.2%), and wheat (0.06%) (Table 2). The most convincing evidence for food allergy was present in 1.4% of food-allergic patients (group 1), with a total of 2.9% of patients (groups 1, 2, and 3) having a likely food allergy and 2.8% having strong evidence for food allergy (groups 1 and 2) (Table 2). Food allergy was documented by a physician, but medical records suggested that the allergy was less likely, in 0.5% (group 4) (Table 2). When examined by cases in which food allergy is considered likely (groups 1, 2, 3), allergy to peanut remained most prevalent (1.4%), followed by shellfish (1.0%), egg (0.8%), tree nut (0.7%), fish (0.4%), milk (0.3%), fruit (0.33%), soy (0.18%), and wheat

Table 2
Physician-documented food allergy prevalence according to various definitions

	Group 1 History of clinical reaction in conjunction with positive testing (SPT ≥3 mm or food-specific IgE level > 0.35 kU/L) or if there was a food-specific IgE level > 95% predictive value	**Group 2** History of convincing, immediate symptoms such as anaphylaxis, hives or urticaria, angioedema, trouble breathing, oral pruritis, or throat closing, but without testing documentation	**Group 3** History of positive testing (SPT ≥3 mm or food-specific IgE level > 0.35 kU/L but < 95% predictive value for a given food if known or < 50kU/L) without a documented history of clinical reaction	**Group 4** Food allergy documented in the medical history, but nonspecific or unclear symptoms (ie, rash, itching, diarrhea, nausea, vomiting) and no testing performed
Food allergy patients ($n = 313$) (% out of 9,184 total patients)	127 (1.4%)	131 (1.4%)	10 (0.1%)	45 (0.5%)
Groups by food				
Peanut ($n = 146$)	62 (0.7%)	43 (0.5%)	16 (0.2%)	25 (0.3%)
Shellfish ($n = 104$)	24 (0.3%)	48 (0.5%)	16 (0.2%)	16 (0.2%)
Tree nut ($n = 77$)	31 (0.3%)	12 (0.1%)	27 (0.3%)	7 (0.1%)
Egg ($n = 74$)	45 (0.5%)	17 (0.2%)	5 (0.1%)	7 (0.1%)
Milk (n=45)	22 (0.2%)	8 (0.09%)	1 (0.01%)	14 (0.2%)
Fish ($n = 32$)	16 (0.2%)	9 (0.1%)	5 (0.1%)	2 (0.02%)
Fruit ($n = 31$)	0	23 (0.3%)	3 (0.03%)	5 (0.1%)
Soy ($n = 17$)	9 (0.1%)	5 (0.05%)	3 (0.03%)	0 (0%)
Wheat ($n = 6$)	4 (0.04%)	0	2 (0.02%)	0

(0.06%) (Table 2). Regarding groups 1 and 2, which have strong evidence for food allergy, peanut allergy is still the most common (1.2%), followed by shellfish (0.8%), egg (0.7%), tree nut (0.4%), milk (0.29%), fish (0.3%), fruit (0.3%), soy (0.15%), and wheat (0.04%) (Table 2).

Characteristics of food-allergic patients

Among children with food allergy, the median age was 7 years at the time of the chart review, with a mean age of 1 year at diagnosis when those data were available (Table 1). Most patients were male (59%) (Table 1). Coexisting allergic disease was common, and approximately half carried a diagnosis of asthma, atopic dermatitis, or allergic rhinitis (Table 1).

The overall rate of food allergy was the same in younger (age ≤ 5 years) and older (age 6–21 years) food-allergic patients (Table 3). In younger patients, the 3 most common food allergies were peanut, egg, and milk, whereas peanut, shellfish, and tree nut allergies were most common in older children (Table 3). Egg, milk, fish, and wheat allergy were significantly more common in younger patients, whereas shellfish and fruit allergy were significantly more common in older patients. No significant differences were seen in rates of peanut and tree nut allergy with respect to age (Table 3).

Table 3
Food allergy characteristics by age

	Age 0–5 *N* (%)	Age 6–21 *N* (%)	*P* value
Overall no. of clinic patients in age group	3,740	5,444	
Overall food allergy	127 (3.4%)	186 (3.4%)	1
>1 Food allergy	67 (1.8%)	72 (1.3%)	.08
Peanut	57 (1.5%)	87 (1.6%)	.7
Shellfish	20 (0.5%)	84 (1.5%)	**.0001**
Tree nut	33 (0.8%)	43 (0.8%)	.6
Egg	49 (1.3%)	25 (0.4%)	**.0001**
Milk	39 (1.0%)	6 (0.1%)	**.0001**
Fish	20 (0.5%)	12 (0.2%)	**.02**
Fruit	6 (0.1%)	25 (0.5%)	**.02**
Soy	11 (0.3%)	6 (0.1%)	.05
Wheat	5 (0.1%)	1 (0.01%)	**.004**
Of patients with food allergy:			
History of food-induced anaphylaxis	11 (8.7%)	33 (18%)	**.03**
Documentation of an epinephrine autoinjector prescription in the medical record	97 (77%)	153 (82%)	.27
Documentation of an emergency action plan	68 (54%)	51 (27%)	**.0001**
Referral to specialty care	101 (80%)	109 (59%)	**0.0001**
Patients seen by allergy	77 (61%)	62 (33%)	**0.0001**

Bold *P* values indicate significance.

Peanut-allergic patients had significantly higher rates of asthma (62% vs 40%, $P < .0001$), oral corticosteroid use for asthma (26% vs 12%, $P = .04$), and atopic dermatitis (66% vs 41%, $P < .0001$) than those without peanut allergy, although no significant difference was seen in rates of any asthma hospitalizations (14% vs 14%, $P = 1$), emergency room visits in the last year for asthma (23% vs 18%, $P = .5$), or allergic rhinitis (53% vs 45%, $P = .2$). Food allergy patients with shellfish allergy had significantly higher rates of asthma (59% vs 46%, $P = .04$) and allergic rhinitis (59% vs 44%, $P = .02$). No differences were seen in indicators of asthma severity or rates of atopic dermatitis (50% vs 53%, $P = .7$) in those with and without shellfish allergy.

Food-allergic reaction severity

Overall, a history of food-induced anaphylaxis was seen in 13.7% of all children with physician-documented food allergy (Table 1). Food-induced anaphylaxis was significantly more common in children ages 6 to 21 years as compared with younger children (Table 3). No difference were seen in rates of food-induced anaphylaxis in terms of race or sex.

Regarding reactions to the different food allergens, anaphylaxis was most commonly seen in children with allergy to peanut (15.1%), fish (12.5%), milk (11.1%), and tree nuts (10.4%) (Fig 1). Cutaneous reactions were the most frequent food-allergic reaction overall. Angioedema was the second most common reaction (14% of reactions), followed by anaphylaxis (12% of reactions). However, anaphylaxis was the second most commonly reported reaction to peanut, tree nuts, and milk, whereas angioedema was the second most commonly reported reaction to shellfish and fish. Gastrointestinal and respiratory reactions were less common in this population.

A number of peanut-, tree nut–, and shellfish-allergic patients had never ingested the food but were avoiding these foods because of positive tests and had unknown clinical reactivity (Table 2). All of these patients had at least 1 other food allergy, which was evaluated by an allergist. Food reaction history was nevertheless available for most patients with specific food allergies.

Food allergy management

Of all patients with food allergy, 67% had documentation of a referral to an allergist, and two-thirds of these patients (45%

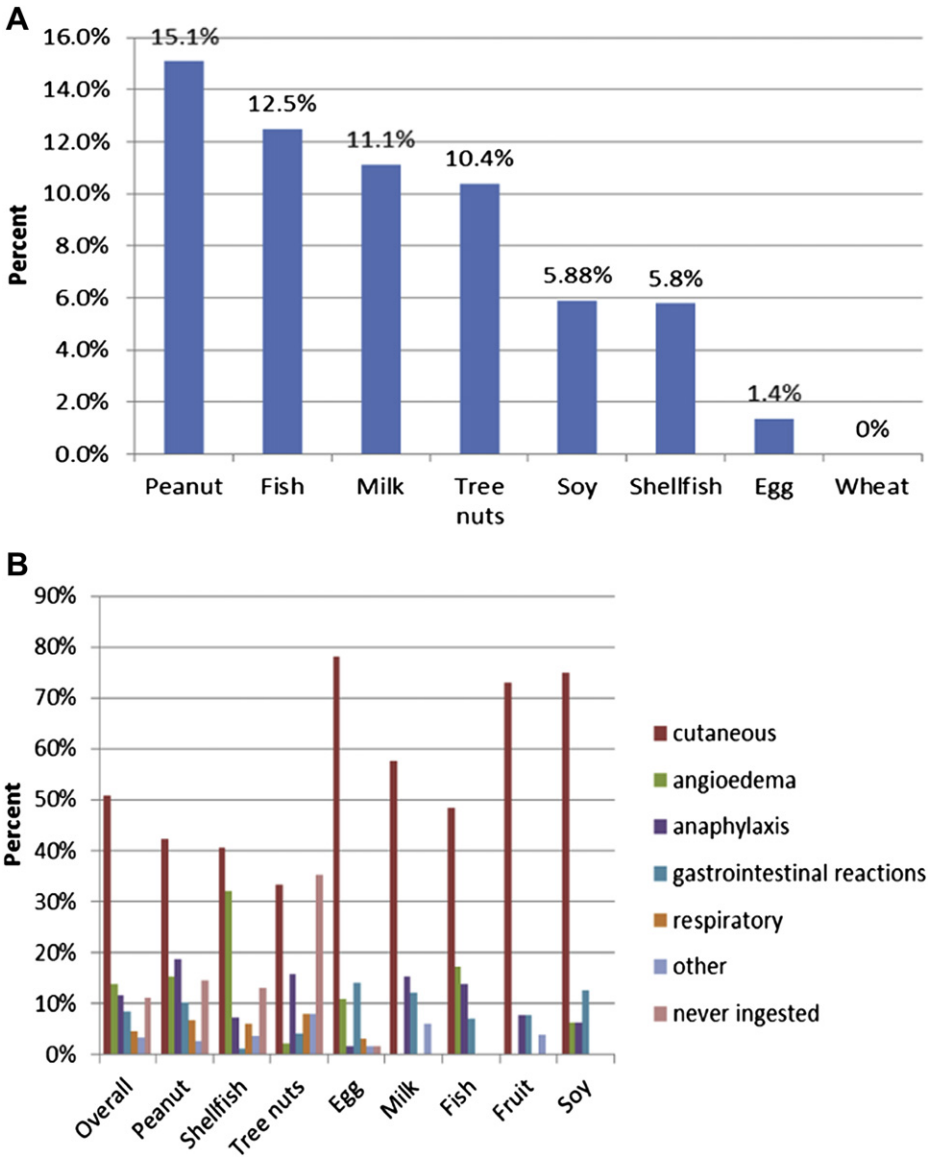

Figure 1. *A,* Rates of anaphylaxis in patients with each food allergy. *B,* Types of food-allergic reactions overall and per food.

overall) were actually seen by an allergist (Table 5). For the remaining patients who were referred to but not seen by an allergist, most never scheduled an appointment or did not show up for their scheduled appointment (Table 4). No significant differences were seen with regard to sex and race for those patients who received referrals and those who did not. However, significantly more patients aged 0 to 5 years were referred to and seen by an allergist as compared with older patients (Table 3). Patients allergic to peanut, tree nuts, egg, soy, and wheat were significantly more likely to have been seen by an allergist (Table 4). This was expected, because younger patients more often had allergies to milk, egg, wheat, and soy (Table 3). A history of food-induced anaphylaxis was more common in those children who were seen by an allergist (Table 4). In addition, children who had evaluation by an allergist were more likely to have additional atopic diseases, including atopic dermatitis and allergic rhinitis.

Among children with food allergy, most had documentation of an epinephrine autoinjector prescription (79.9%), and no significant differences were seen in epinephrine autoinjector prescription rates with regard to age, race, or sex (Tables 3, 5; data not shown). However, food-allergic children who had been evaluated by an allergist were more likely to have an epinephrine autoinjector prescription ($P < .0001$, Table 4). Only food-allergic children who had been evaluated by an allergist had documentation of a food allergy action plan in the medical record (Table 5).

Food allergy characteristics by race

Notable differences in food allergy prevalence and characteristics were seen in black patients vs patients of other races who were seen in clinic, which consisted primarily of Hispanic and multiracial patients. The overall prevalence of food allergy was significantly higher in black patients than in patients of other races (4.7% vs 2.7%, $P < .0001$). Although the most common food allergens were similar between the 2 groups, black children had significantly higher rates of peanut, shellfish, and tree nut allergy (Table 5). In addition, black children had higher rates of multiple food allergies. Although the median age of the black patients with food allergy was older (age 9 years vs 6 years, $P = .003$), no significant difference was seen in the median age at diagnosis, sex, or rates of food-induced anaphylaxis. Management of food allergy was comparable between groups, and no differences were seen in

Table 4
Food allergy management

All patients with food allergy (*N* = 313):	
Documentation of an epinephrine autoinjector prescription in the medical record	250 (79.9%)
Documentation of an emergency action plan	119 (38.2%)
Referral to specialty care	210 (67%)
Patients seen by specialty care allergist	141 (45%)
Cancelled appointment	2 (1%)
Did not show up at appointment	34 (11%)
Never scheduled an appointment	30 (9%)
Appointment scheduled for a future date	4 (1%)

	Seen by allergy (*N* = 141) *N* (%)	**Not seen by allergy (*N* = 172)** *N* (%)	*P* value
>1 Food allergy	81	50	**.0001**
Peanut	81 (57.4%)	63 (36.6%)	**.0002**
Tree nut	60 (42.6%)	17 (9.9%)	**.0001**
Egg allergy	52 (36.9%)	22 (12.8%)	**.0001**
Shellfish allergy	39 (27.7%)	65 (37.8%)	.07
Milk allergy	24 (17.0%)	21 (12.2%)	.3
Fish allergy	19 (13.5%)	13 (7.6%)	.1
Soy	12 (8.7%)	5 (2.9%)	**.04**
Wheat	6 (4.3%)	0 (0.0%)	**.008**
Fruit	5 (2.9%)	25 (14.5%)	**.0003**
History of food-induced anaphylaxis	24 (17.4%)	16 (9.3%)	**.04**
Documentation of an epinephrine autoinjector	133 (94%)	117 (68%)	**.0001**
Documentation of emergency action plan	118 (84%)	1 (0.6%)	**.0001**
Asthma	71 (51.4%)	83 (48.3%)	.6
Atopic dermatitis	99 (65.6%)	63 (36%)	**.0001**
Allergic rhinitis	74 (49.0%)	75 (42.9%)	.09

Bold *P* values indicate significance.

referral rates for allergy evaluation, rates of patients seen by an allergist, or frequency of documentation of an epinephrine autoinjector prescription and food allergy action plan.

Regarding comorbid allergic disorders, significantly more black food allergy patients suffered from asthma than food allergy patients of other races (56.5% vs 43.4%, $P = .03$). Similar rates of emergency room visits and hospitalization for asthma were seen between races. Rates of atopic dermatitis and allergic rhinitis were not significantly different (Table 5).

Discussion

The aim of this study was to determine the prevalence and characteristics of physician-documented food allergy in a large,

Table 5
Characteristics of and rates of overall food allergy in black children versus children of other races seen in clinic

	Black *N* (%)	Combined other races *N* (%)	*P* value
Total number of patients in general pediatric clinic	3460	5724	
Total with food allergy	161 (4.7%)	152 (2.7 %)	**.0001**
>1 food allergy	61 (1.8%)	65 (1.1%)	**.02**
Peanut allergy	73 (2.1%)	73 (1.3%)	**.003**
Shellfish allergy	68 (2.0%)	36 (0.6%)	**.0001**
Tree nut allergy	43 (1.2%)	34 (0.6%)	**.001**
Egg allergy	36 (1.0%)	38 (0.7%)	.05
Milk allergy	18 (0.5%)	27 (0.5%)	.6
Fish allergy	17 (0.5%)	15 (0.3%)	.07
Fruit allergy	17 (0.5%)	14 (0.2%)	.06
Soy allergy	8 (0.2%)	9 (0.2%)	.3
Wheat allergy	1 (0.03%)	5 (0.09%)	.4
Patients with food allergy	161	152	
Males	88 (55%)	98 (64%)	.08
Females	73 (45%)	54 (36%)	
Age	9 yrs (1 yr to 21 yrs)[a]	6 yrs (1.3 yrs to 21 yrs)[a]	**.003**
Age at time of diagnosis	2 yrs (4 mo to 4 yrs)[a]	1 yr (4 mo to 8 yrs)[a]	.1
History of food-induced anaphylaxis	26 (16.1%)	17 (11.2%)	.3
Documentation of an epinephrine autoinjector	133 (82.6%)	117 (77.0%)	.3
Documentation of an emergency action plan	61 (37.9%)	58 (38.2%)	1
Referral to specialty care	107 (66.2%)	103 (67.8%)	.8
Patients seen by allergy	69 (42.9%)	70 (46.1%)	.6
Asthma	91 (56.5%)	66 (43.4%)	**.03**
Asthmatics with emergency room visits in last year	21 (23.1%)	20 (30.3%)	1
Asthmatics ever hospitalized	11 (12.1%)	19 (28.8%)	.1
Atopic dermatitis	89 (55.3%)	75 (49.3%)	.3
Allergic rhinitis	85 (52.8%)	67 (44.1%)	.1

Bold *P* values indicate significance.
[a]Median age with range.

low-income population of predominantly black and Hispanic patients from East Harlem, New York. Although previous studies have examined IgE sensitization in this population, little has been reported on physician-documented food allergy and features of food allergy. We found the overall prevalence of food allergy to be 3.4% in this population, and this number comprised all patients with documentation of food allergy in the medical record (groups 1–4). This number was somewhat lower than previously reported national estimates.[1,3] When the prevalence of food allergy was determined based on those most likely to have a food allergy (groups 1 and 2), the overall food allergy prevalence was even lower, at only 2.8%. Rates of specific food allergies to peanut, tree nut, and shellfish were comparable to the most recently reported national estimates in this age group.[2,3,12] However, we found a significantly lower prevalence of milk allergy (0.5%) than that recently reported by Gupta et al (1.7%) (χ^2, $P < .0001$).[3] This may be attributable to ethnic, cultural, socioeconomic, or other differences of this population. Alternatively, the lower prevalence may be attributable to the fact that this study reports physician-documented food allergy, whereas Gupta et al relied on self-reports of food allergy, which can overestimate prevalence.

Whereas most children with physician-documented food allergy had an epinephrine autoinjector prescription in the medical record, most did not have documentation of a food allergy action plan, which is recommended by the recent food allergy guidelines.[11] Most children who had documented food allergy action plans had been evaluated by an allergist, which suggests that general pediatricians are not prescribing or not documenting distribution of food allergy action plans. This is particularly concerning in light of the recent publication by Fleischer et al,[13] which reported undertreatment of severe reactions even in a population of infants followed at major food allergy centers, suggesting that the population reported in this study, who largely do not have food allergy action plans, is at considerable risk of undertreatment of anaphylaxis. Educational interventions should be aimed at raising general pediatrician awareness of recent food allergy guidelines, on-line locations where food allergy action plans can be accessed quickly, and the need for epinephrine autoinjector teaching with documentation in the medical record.

Children with peanut allergy had higher rates of asthma and atopic dermatitis than food allergy patients without peanut allergy. Additionally, patients with shellfish allergy had higher rates of asthma and allergic rhinitis compared with non–shellfish-allergic patients. This suggests that peanut and shellfish allergy may confer risk for asthma, or vice versa, or may be a sign of more severe atopy in general. Wang et al[5] reported an increase in asthma morbidity in those patients with food allergen sensitization, specifically peanut sensitization. Similarly, Liu et al[4] reported an increased odds ratio of asthma in those patients with peanut-specific and shrimp-specific IgE sensitization using the NHANES data.

Consistent with previous reports, we found that black children had significantly higher rates of food allergy as compared with children of other races. This group also had higher rates of multiple food allergies. Black children in our population had rates of physician-documented peanut, shellfish, tree nut, and egg allergy higher than those previously published from self-reports of allergy in the general population.[3] This is in line with reports of increased odds of elevated peanut-specific and egg-specific IgE levels in patients with a history of African ancestry.[6] Rates of asthma were also high in our population of food-allergic black patients, which is consistent with reports of a high-degree food allergen sensitization in inner-city patients with asthma.[4,5] The high rates of asthma, multiple food allergies, and lack of food allergy action plans likely places these children at risk of having food allergic reactions that are not properly managed. Because of the demographic characteristics of this clinic population with few caucasian and Asian subjects, we were unable to assess the rates and characteristics of food allergy in these populations.

Limitations include the retrospective nature of this study, lack of documented clinical reactivity for foods in all patients, and errors in documentation, such as miscoding or lack of physician documentation regarding food allergy history or management plans. Parental lack of awareness of food allergy is another possibility, in that parents may not be reporting their child's symptoms to the physician, although this seems unlikely given that most over-report food allergies (up to 35% of the general population self-report having a food allergy).[14] The physicians of this hospital pediatric clinic receive food allergy education as part of their training, and this hospital is a known referral center for food allergy (Jaffe Food Allergy Institute). Thus, greater awareness of food allergy likely exists at this medical center, leading to higher food allergy diagnosis rates than at other institutions, affecting the generalizability of our data. A major limitation in assessing food allergies by race was that 32% of subjects in the clinic had race documented as "other," which is often attributable to multiracial status. Therefore, we were unable to identify all patients of African ancestry, and the numbers of patients of Hispanic origin is likely significantly higher than reported. Documentation of race has become an increasingly complex issue, even in regards to the United States Census, given our multiracial society.[15]

A major strength of this study is the large number of subjects, with more than 9,000 children attending this pediatric clinic over a 2-year period. Although previous studies have assessed food allergy prevalence in larger numbers of subjects, this represents the largest population of urban, low-income, minority children to be reported.[1–4,6,12,16–18] As well, use of physician documentation is a more accurate measure of food allergy than the use of food-specific IgE or self-reported allergy alone. Allergies to all foods were included in the analysis, and the medical records provided additional information regarding severity of reactions, food allergy management, and other atopic disorders. Furthermore, almost half of the patients had been evaluated by an allergist and had confirmatory testing for their food allergy.

In conclusion, data have been lacking on food allergies in urban minority patients, and this is the largest study thus far examining physician-documented food allergies in this population. Food allergies appear to be more prevalent in black children than in children of other races; however, the overall prevalence appears lower than expected based on recent reports. Our results also indicate a need for improvements in food allergy management in this population. Although nearly 80% of children with physician-documented food allergy had epinephrine autoinjector prescriptions in the medical record, only 40% had an emergency action plan for food allergy documented. Primary care physicians should have more education on the use and availability of action plans, and all physicians should provide them to their patients and clearly document their distribution and explanation in the medical record. Finally, only 46% of patients had their food allergy evaluated by an allergy specialist. Many food allergy patients were referred more than once to an allergist (data not shown) and were never seen because an appointment was not scheduled or the child did not show up for the scheduled appointment. Patients and physicians should be aware of the importance of an accurate diagnosis of food allergy, because unnecessary avoidance of foods may have nutritional, developmental, and social impacts. Furthermore, food allergy education is essential to ensure appropriate food allergen avoidance and emergency management for allergic reactions. Additional studies are needed to further examine the racial and ethnic differences in food allergy prevalence and triggers, identify possible risk factors in these groups, and improve food allergy management.

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