Original Article

Food Allergy–Related Risk-Taking and Management Behaviors Among Adolescents and Young Adults

Christopher M. Warren, BA[a], Ashley A. Dyer, MPH[a], Alana K. Otto, MD[a,b], Bridget M. Smith, PhD[a,c], Kristen Kauke, MSW, LCSW[d], Chitra Dinakar, MD[e], and Ruchi S. Gupta, MD, MPH[a,b] *Chicago, Hines, and St Charles, Ill; and Kansas City, Mo*

What is already known about this topic? Adolescents with food allergy (FA) are at particularly high risk of fatal anaphylaxis; however, they regularly participate in behaviors that may increase their risk of anaphylaxis. FA negatively impacts affected adolescents' quality of life.

What does this article add to our knowledge? Adolescents and young adults clustered into 2 latent classes reflecting different levels of risk-taking behavior. AYA with greater peer, parent, or teacher support or an established 504 plan were less risky. Multiple positive outcomes of FA were identified.

How does this study impact current management guidelines? This article identifies clinical, demographic, and social factors associated with greater FA-related risk-taking behavior among AYA—as well as positive outcomes associated with FA—which can be targeted by clinicians during patient education.

BACKGROUND: Food allergy (FA) affects 8% of children and adolescents in the United States. Nearly 40% of those affected have experienced severe reactions. Fatal food-induced anaphylaxis is most common among adolescents and young adults (AYA); however, FA-related risk behaviors persist in this population and factors associated with these behaviors remain unclear.
OBJECTIVE: To characterize FA-related risk-taking and self-management behaviors of AYA with FA.
METHODS: A cross-sectional survey was administered to 200 AYA with FA. Latent class analysis was used to identify distinct behavioral risk classes and predictors of risk class membership.
RESULTS: Two distinct FA behavioral risk classes were identified, representing less (N = 120) and more (N = 80) risky subpopulations. After adjusting for age, sex, and anaphylaxis history, odds of more risky class membership were significantly reduced for AYA with peanut allergy (odds ratio [OR], 0.27; 95% CI, 0.11-0.65), supportive female friends (OR, 0.27; 95% CI, 0.07-0.99), overprotective mothers (OR, 0.42; 95% CI, 0.18-0.97), teachers who are aware of their FA (OR, 0.39; 95% CI, 0.17-0.91), a history of being bullied (OR, 0.22; 95% CI, 0.09-0.51), and an established 504 education plan (OR, 0.35; 95% CI, 0.15-0.81). AYA also reported numerous positive outcomes of their FA, such as greater responsibility, empathy, and improved diet, which was significantly associated with reduced odds of risky class membership (OR, 0.38; 95% CI, 0.18-0.80).
CONCLUSIONS: Among AYA, increased FA-related risk-taking was associated with clinical, demographic, and social factors, including peanut allergy, greater age, as well as absence of social support and specific school FA policies. These associations may be used to inform future interventions designed to address FA-related risk and management behaviors. **(J Allergy Clin Immunol Pract 2017;5:381-90)**

Key words: *Food allergy; Risk-taking behaviors; Adolescents and young adults (AYA); Self-management; Social support; Latent class analysis (LCA)*

Food allergy (FA) affects an estimated 8% of children and adolescents in the United States.[1,2] Nearly 40% of children and adolescents with FA have experienced severe, potentially life-threatening reactions,[2] with growing numbers of children and adolescents presenting to emergency departments with food-induced anaphylaxis.[3] Moreover, nearly 70% of FA-related fatalities reported in an anaphylaxis registry occurred among adolescents and young adults (AYA) aged 13 to 24 years.[4] Adolescents in particular have been shown to be at increased risk of mortality due to food-induced anaphylaxis if they delay administration of epinephrine and/or have a diagnosis of asthma.[5-8] Multiple studies have shown that AYA regularly participate in behaviors that may increase their risk of anaphylaxis, such as eating foods that "may contain" allergens.[7,9,10] In addition, AYA

[a]Northwestern University Feinberg School of Medicine, Chicago, Ill
[b]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Ill
[c]Edward J. Hines Jr VA Hospital, Center for Management of Complex Chronic Care, Hines, Ill
[d]Creekwood Associates, St Charles, Ill
[e]Children's Mercy Hospital, Kansas City, Mo
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Corresponding Address: Ruchi S. Gupta, MD, MPH, Northwestern University Feinberg School of Medicine, 750 N Lake Shore Dr, 6th Fl, Chicago, IL 60611. E-mail: r-gupta@northwestern.edu.
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Abbreviations used
$_{Adj}$OR- Adjusted odds ratio
AYA- Adolescents and young adults
EAI- Epinephrine autoinjector
FA- Food allergy
LCA- Latent class analysis

do not reliably inform their social networks of their allergies, train peers on the use of epinephrine in case of an emergency, or carry or store epinephrine where they live, learn, and participate in daily activities.[7,9]

AYA with chronic illnesses, including FA, are often expected to assume greater autonomy and responsibility with regard to the management of these illnesses as they transition toward adulthood. Physicians often play a key role in helping AYA navigate this transition; thus, it is critical that clinicians caring for AYA with FA provide appropriate patient education and counseling about the management of FA, including strategies to minimize the risk of accidental allergen exposure. However, no work to date has systematically examined factors associated with FA-related risk-taking and self-management behavior among AYA that may inform the development of effective interventions targeting these behaviors. We therefore sought to characterize FA-related risk-taking and self-management behaviors and examine factors associated with these behaviors via latent class analysis (LCA). LCA has been previously used by allergists to identify and describe multiple atopic phenotypes, which were not known in advance, but rather, were inferred from clinical data.[11] In the present study, we hypothesized that participants would fall into distinct patterns of FA-related risk-taking and management behaviors, which could then be predicted by multiple clinical, demographic, and social factors.

METHODS

This study used a cross-sectional survey administered between June 2014 and January 2015 to AYA with food allergy and was approved by appropriate institutional review boards.

Survey development and design

A 50-question survey was developed by pediatricians, pediatric allergists, health services researchers, and FA educators. Survey domains included demographic information, FA history, reaction history, FA-related risk taking (ie, food choices and epinephrine carriage), perceived social support, perceived positive aspects of living with FA, FA-related desires, and a general risk-taking assessment. Items were drawn from previous electronically administered population-level surveys where possible.[2] Expert panel review and cognitive interviews of adolescents (n = 5) assessed clarity and general understandability of each survey item. Cognitive interviews were performed by a member of the study team either in-person or over the phone. The survey was then programmed for electronic administration using the Research Electronic Data Capture platform,[12] and quality control testing was conducted. Figure E1 in this article's Online Repository at www.jaci-inpractice.org contains the items included in the final survey instrument.

Study participants

Eligible participants included English-speaking AYA aged 14 to 22 years with 1 or more current FA. Participants older than 18 years

TABLE I. Demographic characteristics of adolescents with FA

Variable	Frequency, % (n) All adolescents (N = 200)
Age (y)	
14	24 (44)
15	16 (28)
16	14 (15)
17	10 (18)
18	12 (22)
19	8 (15)
20	8 (15)
21	3 (6)
22	4 (7)
Missing	10 (20)
Sex	
Female	58 (116)
Male	33 (65)
Missing	10 (19)
Race/ethnicity	
Caucasian/white	79 (152)
Asian	9 (18)
Hispanic/Latino	3 (5)
African American/black	1 (2)
Native American	2 (3)
Other	3 (6)
Additional medical conditions	
Environmental allergies	67 (134)
Asthma	55 (110)
Eczema	35 (69)
ADD/ADHD	10 (21)
Celiac	3 (5)
Diabetes	2 (3)
Other	12 (24)
Allergy	
Peanut	76 (151)
Tree nut (almonds, pecans, cashews, etc)	76 (151)
Milk/dairy	30 (59)
Shellfish (shrimp, lobster, crab, etc)	27 (53)
Egg	20 (39)
Sesame	19 (38)
Soy	15 (30)
Fin fish (salmon, tuna, trout, etc)	13 (26)
Wheat	12 (24)
Other	34 (68)
Number of allergies	
1	21 (41)
≥2	79 (159)
History of anaphylaxis	
Yes	54 (108)
No	32 (63)
I don't know	19 (10)
Missing	10 (5)
Number of severe FA reactions during past year	
0	63 (126)
1-5	29 (57)

(continued)