



Letter

Food allergy education program at an elementary school A pilot study

Food allergy (FA) is common among elementary school children, with a reported 19.7% experiencing FA-related symptoms.¹ Adverse reactions to foods occur frequently even though schools have preventive measures against FA reactions.² A past survey revealed that students in elementary school did not fully understand FA.¹ Notably, even though older, many teenagers with FA did not inform their friends about their FA-related condition.³ It has been previously reported that bullying related to FA is a serious issue in schools.⁴ A previous review noted that schools need to perform intervention to prevent bullying related to FA.⁵ The World Health Organization defined *health literacy* as the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health. A systematic review found that children with low literacy tended to have worse health behavior.⁶ Health literacy is considered effective in improving preventive care, and it can also be applied to proactive management (controlling a situation by making things happen or by preparing for possible future problems) of FA by individuals.

Although FA education has been developed for school nurses, there is no standard school curriculum regarding FA for children. Current guidelines focus on education for school staff, children with FA, and their families.⁷ Furthermore, children without FA should also undergo FA education. Such education may help them to respond appropriately when they experience emergency FA reactions in other children and reduce bullying children with FA.

To that end, we developed a food allergy program to promote health literacy among schoolchildren. The aim of this study was to develop a FA education program and evaluate how the FA education program was tolerated by elementary school children and how their perceptions and attitudes toward FA changed.

The FA education program was developed and conducted by an interdisciplinary team of allergists, pediatricians, a science communicator, a medical illustrator, schoolteachers, and parents. The goals of the program are to improve the children's literacy in FA and to change the perception and attitude toward FA. The program topics include the following: (1) FA signs and symptoms, (2) immunologic reaction in the body, (3) food allergens, (4) food label reading, (5) how to be a good friend with classmates with FA, (6) how to take action for an emergency case of FA, and (7) epinephrine autoinjector hands-on demonstration training. The program contained an oral presentation by the allergist. The presentation was performed using PowerPoint slides with comprehensive illustrations drawn by the medical illustrator and informative content

created by the science communicator. Two sets of slides were prepared: one for the first to the third graders (lower graders) and the other for the fourth to the sixth graders (upper graders). The slides for the lower graders contained easier characters and more basic content. In addition, we held group discussions for topics 4, 5, and 6 and allowed the children to practice with a trainer on how to use the epinephrine autoinjector. A physician used a trainer pen to demonstrate how to use the epinephrine autoinjector, and then the children practiced using a trainer pen. For recruitment, in July 2015, we disseminated a paper-based explanation of the study to the parents of 619 children at a Japanese public school. In addition, we sent paper-based assent forms for the children. We had opt-out recruitment, and only children with parental agreement were enrolled in the program. Our program was provided to school children as one of the summer school programs in the elementary school. The maximum number of the participants in our program was limited to 42 on a first-come-first-served basis because of the limited space of the classroom. We conducted 2 sessions of 60-minute FA education program for children in August 2015.

To evaluate the program, the participants completed paper-based questionnaires in Japanese before and after the program for evaluation of the acceptability of the program and their perceptions and attitudes toward FA before and after the program. The questionnaires used simple Japanese language to ensure comprehension. However, if the children had trouble understanding, research volunteers assisted them. Statistical analysis was performed only for children without FA and no missing variables. The Wilcoxon rank sum test was used to examine differences in perceptions and attitudes before and after the program. $P < .05$ was considered significant. SPSS statistical software for Windows, version 19.0 (SPSS Inc, Chicago, Illinois), was used for the statistical analysis.

The study was approved by the institutional review board of the National Center for Child Health and Development in Tokyo, Japan. The trial was registered with the University Hospital Medical Information Network (umin.ac.jp Identifier: UMIN00017772).

A total of 42 participants were enrolled in the FA program, of whom 36 completed the questionnaires both before and after the program, with no missing variables. Eight children had a history of food allergy. Twenty-eight students without FA and no missing variables were included in the analysis. The number of male students was 19. Twenty-seven participants stated that the FA program was useful and easy to understand, and 25 of them thought that the FA program should be included in the regular curriculum for all schoolchildren (Table 1). The number of participants who felt more confident in taking action for an emergency case of FA increased after participation in the FA program (25/28 vs 8/36, $P < .001$). The perception and attitude toward FA also improved after the program.

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Table 1
Evaluation of the program by the 28 students

Variable	No. (%) of students		P value
	Before program	After program	
Acceptability			
The program was comprehensive			
Agree		24 (85.7)	
Somewhat agree		3 (10.7)	
Somewhat disagree		1 (3.6)	
Disagree		0	
The program was good			
Agree		25 (89.3)	
Somewhat agree		3 (10.7)	
Somewhat disagree		0	
Disagree		0	
The program should be included as a regular class			
Agree		22 (78.6)	
Somewhat agree		3 (10.7)	
Somewhat disagree		0	
Disagree		3 (10.7)	
Perceptions and attitudes			
I understand the food allergy mechanism			
Agree	1 (3.6)	24 (85.7)	<.001 ^a
Somewhat agree	9 (32.1)	3 (10.7)	
Somewhat disagree	7 (25)	1 (3.6)	
Disagree	11 (39.3)	0	
I understand that food allergy is related to death			
Agree	12 (42.9)	28 (100)	<.001 ^a
Somewhat agree	10 (35.7)	0	
Somewhat disagree	3 (10.7)	0	
Disagree	3 (10.7)	0	
I understand how to read food labels			
Agree	10 (35.7)	26 (92.9)	<.001 ^a
Somewhat agree	9 (32.1)	1 (3.6)	
Somewhat disagree	3 (10.7)	0	
Disagree	6 (21.4)	1 (3.6)	
I know what Epipen is			
Agree	0	28 (100)	<.001 ^a
Somewhat agree	2 (7.1)	0	
Somewhat disagree	4 (14.3)	0	
Disagree	22 (78.6)	0	
I understand the need to care for children with FA			
Agree	9 (32.1)	24 (85.7)	<.001 ^a
Somewhat agree	14 (50.0)	3 (10.7)	
Somewhat disagree	1 (3.6)	1 (3.6)	
Disagree	4 (14.3)	0	
I know I must not give snacks to children with FA			
Agree	21 (75.0)	28 (97.2)	.01 ^a
Somewhat agree	5 (17.9)	0	
Somewhat disagree	1 (3.6)	0	
Disagree	1 (3.6)	0	
I am confident I can take immediate action if I witness an accident related to FA			
Agree	1 (3.6)	17 (60.7)	<.001 ^a
Somewhat agree	7 (25.0)	8 (28.6)	
Somewhat disagree	9 (32.1)	2 (7.1)	
Disagree	11 (39.3)	1 (3.6)	

Abbreviation: FA, food allergy.

^aWilcoxon rank sum test.

To the best of our knowledge, this is the first report to find that an FA program for elementary schoolchildren was well tolerated and that perceptions and attitudes toward FA improved. However, we did not verify the effectiveness of this study because this was a single-armed pilot study with a small sample. We recruited the limited number of the participants because of the limitation of the space and the date as a summer school program. Nevertheless, we revealed that the perception and attitude of participants improved

after this intervention and that the program was well tolerated by schoolchildren without FA.

To improve the quality of life in children with FA, sharing information on FA is important. The Japanese government implemented the Basic Law on Shokuiku (food and nutrition education)⁸ and has been active in promoting school health education, including food education.⁹ To develop FA literacy and proactive management for FA at school, education programs on FA should also be provided to children without FA. We hope to conduct a prospective, interventional, controlled study enrolling a large number of students at multiple schools to verify the long-term effectiveness of this program, which we developed in this pilot study, and to examine how frequently the program should be repeated as a regular school health education program.

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Kiwako Yamamoto-Hanada, MD*

Tomomi Honda, PhD†

Juna Kurihara, MS, CMI*

Kazue Ishitsuka, MD, MPH‡

Masaki Futamura, MD, PhD§

Yukihiro Ohya, MD, PhD*

*Division of Allergy

Department of Medical Subspecialties

National Center for Child Health and Development

Tokyo, Japan

†Learning and Collaboration Development Division

National Museum of Emerging Science and Innovation

Tokyo, Japan

‡Department of General Pediatrics

National Center for Child Health and Development

Tokyo, Japan

§Division of Pediatrics

Nagoya Medical Center

Nagoya, Aichi, Japan

yamamoto-k@ncchd.go.jp

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