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Effects of training on teachers' food allergy and anaphylaxis management self-efficacy levels

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Abstract
Background: Children are affected by food allergies more than adults, so teachers have the most significant responsibility for food allergy management in schools.
Objective: To determine the effect of food allergies and anaphylaxis management training on Turkish teachers' self-efficacy.
Material and methods: In this study, 90 teachers were selected using convenience sampling. Data were collected before and immediately after the training on School Personnel's Self-Efficacy in Managing Food Allergy and Anaphylaxis at School Scale. A training program that consisted of 60-minute sessions was conducted. Data were evaluated using the paired samples t-test.
Results: There was a significant difference between the teachers' self-efficacy levels before (22.76±8.94) and after the training (32.81±6.09), and self-efficacy levels significantly increased ($p < .05$).
Conclusions: The training increased the teachers' self-efficacy in managing food allergies and anaphylaxis.

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Introduction

Children are affected by food allergies more than adults. Children spend most of their time in school and eat various foods there.[1] Therefore, anaphylaxis occurs most often in schools.[2-5] It has been reported that 18% of students experience an allergic reaction at school at least once.[5] It has also been reported that 20% of school anaphylactic reactions occur after a first encounter with food.[6] Therefore, food allergies and anaphylaxis management at schools have become important issues.[7] Preventive measures should be taken in classrooms, cafeterias, and out-of-school activities to prevent anaphylactic reactions and enable the safe participation of students with food allergies in school activities with their friends.[8]

The Center for Disease Prevention and Control (CDC) suggests that collaborative teams should develop comprehensive plans for food allergies and anaphylaxis management at schools. The teams should include students with food allergies, parents, school personnel, nurses, and healthcare providers.[9] In countries where the numbers of school nurses and healthcare professionals are low, it has been found that teachers need more self-efficacy in managing food allergies and anaphylaxis.[8,10-14] Therefore, it has been suggested that training sessions on food allergies and emergency management should be conducted for school personnel.[9,15]

In Turkey, there are usually no school nurses at schools. Therefore, teachers in regular contact with students should be trained to effectively manage food allergies and anaphylaxis incidents. This study assumes that food allergies and anaphylaxis management training provided to teachers can increase their self-efficacy in managing food allergies and anaphylaxis.

This study investigates the effects of food allergies and anaphylaxis management training on teachers' self-efficacy in managing food allergies and anaphylaxis.

Materials and Methods

Design and setting

The study used a quasi-experimental method with a pretest-posttest without a control group design. It was conducted in the city center of Izmir, Turkey's third-largest city, from May to September 2019. It was conducted on teachers from eight public schools (four primary schools and four middle schools) in the city center.

Sample population and sampling

The sample size was determined to be 71 using the G Power 3.1.9.4 program with a Type I error of 0.05 and a Type II error of 0.20 (based on 0.80 power) based on Gonzalez-Mancebo et al.[8] However, all the teachers at the selected schools were invited to participate in the study using the convenience sampling method because the researchers wanted to train as many of them as possible in group training sessions. A total of 186 teachers agreed to participate in the study. Sixty-two teachers were excluded because they only filled out the pretest, and 34 were excluded because they only completed the posttest. Finally, the sample comprised 90 teachers who completed the pretest and posttest and participated in the training.

Ethics committee approval

Ethical approval was obtained from the ethics committee of the university with which the researchers are affiliated and the provincial directorate of education. Written consent was obtained from all participants.

Instruments

The data were collected using the Turkish version of the School Personnel's Self-Efficacy in Managing Food Allergy and Anaphylaxis Scale (SPSMFAA-T) and a demographic characteristics form.

Polloni et al.[13] developed The School Personnel's Self-Efficacy in Managing Food Allergy and Anaphylaxis Scale. It evaluates the self-efficacy of school personnel (teachers, care providers, etc.) in managing food allergies and anaphylaxis. It is a 5-point Likert-type scale with eight items (Cannot do at all = 1 to Highly certain can do = 5). The scale items evaluate school personnel's self-efficacy in food allergies management (items 1, 2, 5, 6, and 7) and anaphylaxis management (items 3, 4, and 8). The scale score is obtained by adding the item scores and ranges from 8 to 40 points. Higher scores indicate higher self-efficacy. Haney et al.[16] carried out a Turkish validity and reliability study of the scale. The original scale's content validity was ensured by experts' opinions and a pilot study. The validity (x^2 = 176.05, df = 91, p < .001, x^2/df = 3.20, GFI = 0.96, CFI = 0.99, RMSEA = 0.080) and reliability (Cronbach's alpha = 0.91, item-total correlations = 0.50–0.82) study of the Turkish form of the scale used data obtained from 282 teachers. Factor analysis confirmed the original two-factor structure of the scale.

The demographic characteristics form was developed by the researchers. It included questions about teachers' demographic characteristics (workplace, age, gender, experience) and experience and opinions about food allergies and anaphylaxis (having worked with students with food allergies, currently working with students with food allergies, having worked with students with anaphylaxis, etc.).

Procedure

After permissions were obtained, the researchers contacted the school principals to set training and data collection times. After the purpose of the study was explained, the teachers who agreed to participate filled out the School Personnel's Self-Efficacy in Managing Food Allergy and Anaphylaxis Scale before and immediately after the training. The single training program was carried out once at each school. The teachers participated in the training in their schools. They filled out the study scales without any help. They were also informed that their data would only be used for research and not disclosed to others.

This study conducted a Training on Food Allergy and Anaphylaxis Management program at School for Teachers. After the training program's content was prepared, the opinions of five experts (a school nurse, a public health nurse and a pediatric allergy, and an immunology doctor) were consulted. The training included the following topics:

- A description of food allergies, symptoms, and findings
- The foods that most frequently cause allergies
- Diagnosing food allergies
- A description of anaphylaxis, symptoms, and findings
- The factors that cause anaphylaxis
- Treating anaphylaxis
- How to use an adrenaline auto-injector
- Adrenaline auto-injectors on the market and how to get them
- Preventing food allergies and anaphylaxis
- Reading food labels
- Food allergy management at school
- The participation of students with food allergies in school activities
- Anaphylaxis emergency action plans at schools

The researchers carried out the single-session training (60 minutes) as group training in the conference hall of each school. Interactive lectures, questions and answers, discussion, demonstrations, a PowerPoint presentation, a video, a training booklet, and an adrenaline auto-injector were used. For the teachers to improve their abilities in anaphylaxis management, they were shown a video about anaphylaxis, incidence rates, symptoms, the factors that cause anaphylaxis, anaphylaxis treatment, the use of adrenaline auto-injectors, and emergency procedures for anaphylaxis. The researcher demonstrated and explained the steps of using an adrenaline auto-injector. Teachers who volunteered practiced using adrenaline auto-injectors to improve their skills. There was a question-and-answer section at the end of the training so that they could easily ask the questions they had in mind, and the teachers were given a Teachers' Guide for Food Allergy and Anaphylaxis Management at School and a training booklet, Food Allergy Personal Care Plans for Students. The school principals were also given an Anaphylaxis Emergency Action Plan.

Data analysis

The data were analyzed using SPSS 24.0 (Statistical Package for Social Science) statistical package programs. The threshold for statistical significance was $p < 0.05$. The data were evaluated using descriptive statistics (numbers, percentages, means, and standard deviations) and the paired samples t-test.

Results

The participants' mean age was 45.87±8.65 years, and 73.3% were female. Their mean teaching experience was 22.54±7.64 years, and 58.8% worked at primary schools. Of them, 31.1% had worked with a student with food allergies, 12.2% were currently working with students with food allergies, and 5.6% had previously worked with students who experienced anaphylaxis. Of the teachers, 3.3% had previously received training for food allergies and anaphylaxis, 78.9% had previously received first aid training, and 40% knew the symptoms of severe allergic reactions and anaphylaxis. Of them, 34.4% said that they could manage food allergies and anaphylaxis, 45.6% said that managing food allergies and anaphylaxis is the duty of teachers, and 38.9% said that their school had no food allergies and an anaphylaxis action plan. Of the teachers, 37.8% said that emergency treatment medication needed for anaphylaxis was not available at their schools; 86.7% said that they wanted to know how to manage food allergies and anaphylaxis, and 37.8% said that they did not know which foods can cause allergic reactions (Table 1).

Before the training, the participants had low self-efficacy in developing a personal care plan for managing students' food allergies, recognizing the symptoms of anaphylaxis, and administering adrenaline auto-injectors to students with severe allergic reactions (items 2, 4, and 8). Before the training, the participants had slightly higher self-efficacy in managing students at risk for food allergies, cooperating with other professionals and families for food allergies management, and helping students to avoid allergens (items 3, 5, and 6). After the training, a statistically significant increase was found in all scale items ($p < .05$) (Table 2).

Teachers SPSMFAA-T mean score was 22.76±8.94 before and 32.81±6.09 after the training. Their food allergy management mean score was 15.24±6.00 before the training and 20.41±3.99 after the training. Their anaphylaxis management mean score was 7.52±3.29 before the training and 12.40±2.42 after the training. There were statistically significant differences between the teachers' self-efficacy scores before and after the training ($p < .05$) (Table 3). After the training, the teachers' scale and subscale scores increased.

Discussion

The most important cause (66%) of anaphylactic reactions in children is known to be food substances.[17] Of food allergies and anaphylactic reactions, 10–18% occur in schools.[18] Therefore, school personnel need training sessions to prevent exposure to allergens, anaphylaxis, and fatal reactions.[19] This study found that approximately one-third of the teachers had previously worked with students with food allergies or experienced anaphylaxis. Still, only 3.3% had received training for food allergies and anaphylaxis. Another study carried out in Turkey found that teachers' levels of knowledge about food allergies and anaphylaxis were low, that most of them had not received training about this issue, and that schools were unprepared for anaphylaxis.[20] The current study, based on these results, investigated the effect of food allergies and anaphylaxis management training provided by nurse researchers on the self-efficacy of teachers who worked at primary and middle schools in a large city center and did not have a school nurse.

The teachers' responses to the scale items before the training indicated low self-efficacy in developing a personal

Table 1 The teachers' demographic characteristics.

Variables	n	%
Type of school		
Primary	53	58.8
Middle	37	41.2
Age (mean, year)	45.87±8.65	
Gender		
Female	66	73.3
Male	24	26.7
Education		
Associate's degree	6	6.7
Bachelor's degree	77	85.6
Postgraduate	7	7.8
Length of service (mean, year)	22.54±7.64	
Prior experience with students with food allergies		
Yes	28	31.1
No	62	68.9
Working with students with food allergies now		
Yes	11	12.2
No	56	62.2
I do not know	23	25.6
Prior experience with students with anaphylaxis		
Yes	5	5.6
No	85	9.4
Prior training on food allergies and anaphylaxis		
Yes (Seminar)	3	3.3
No	87	96.7
Prior first aid training		
Yes	71	78.9
No	19	21.1
Knowledge of the symptoms of severe allergic reactions and anaphylaxis		
Yes	36	40.0
No	54	60.0
Managing food allergies and anaphylaxis at school		
Yes	31	34.4
No	59	65.6
Thinking that managing food allergies and anaphylaxis at school is the job of teachers		
Yes	41	45.6
No	49	54.4
Having an emergency plan for food allergies and anaphylaxis at school		
No	35	38.9
I do not know	55	61.1
Availability of emergency medication for anaphylaxis at school		
No	34	37.8
I do not know	56	62.2
Wanting to know the management of food allergies and anaphylaxis		
Yes	78	86.7
No	12	13.3

care plan for managing students' food allergies, recognizing the symptoms of anaphylaxis, and administering adrenaline auto-injectors to students with severe allergic reactions. Previous studies also determined that teachers had low self-efficacy in recognizing food allergies, the symptoms of anaphylaxis, and anaphylaxis management and treatment.[10,12,21-23] A study carried out by Polloni et al.[13] found that the self-efficacy of Italian school personnel in recognizing symptoms of students with food allergies, administering medication, and assuring the full participation of students with food allergies in school activities was low. A study in Spain determined that the school personnel (teachers, cafeteria personnel, etc.) had low self-efficacy in recognizing food allergy symptoms, allergic reactions, and anaphylaxis treatment before training.[8] A study in Turkey also found that teachers had high self-efficacy in collaborating with other professionals and families for food allergy management at school and helping students avoid

Table 2 The teachers' self-efficacy in managing food allergies and anaphylaxis before and after training.

SPSMFAA-T Items	Before training	After training	
	Mean±SD	Mean±SD	p**
1. Assure a safe school setting for students with food allergy	3.02±1.40	4.08±1.07	.000*
2. Put in place a personalized care plan for the management of students' food allergy	2.80±1.41	3.92±1.03	.000*
3. Manage a student at risk of allergic reactions to food	3.07±1.33	4.06±0.94	.000*
4. Recognize anaphylaxis symptoms	2.48±1.30	4.16±0.89	.000*
5. Co-work with other professionals and families in food allergy management at school	3.25±1.38	4.25±0.90	.000*
6. Manage allergens avoidance (e.g., reading labels, avoiding contaminations)	3.25±1.24	4.15±0.93	.000*
7. Guarantee full participation in all school activities to students with food allergies (e.g. attending school trips)	2.91±1.35	3.98±0.96	.000*
8. Administer drugs (e.g., adrenaline auto-injector) to a student having a severe and sudden reaction	1.95±1.13	4.16±1.09	.000*

*Paired samples t-test, **p<0.05

Table 3 The teachers' responses to the SPSMFAA-T and its subscales before and after training.

SPSMFAA-T	Pretest Mean±SD	Posttest Mean±SD	t	p**
Scale score	22.76±8.94	32.81±6.09	-11.333	.000*
Food allergy management	15.24±6.00	20.41±3.99	-8.885	.000*
Anaphylaxis management	7.52±3.29	12.40±2.42	-13.373	.000*

*Dependent samples t-test, **p < 0.05

allergens but had lower self-efficacy in recognizing the symptoms of anaphylaxis and administering medication to students with severe allergic reactions.[16]

This study found an improvement in all the teachers' responses to the scale items after the training. After the training, the teachers had higher self-efficacy in ensuring a safe environment at school for students with food allergies, recognizing the symptoms of anaphylaxis, collaborating with other professionals and families for food allergy management, and administering adrenaline auto-injectors to students with severe allergic reactions. Previous studies have also found that training school personnel has improved their recognition of food allergy symptoms and anaphylaxis management.[8] While 40% of kindergarten teachers who were trained about allergies, anaphylactic emergencies, and the use of adrenaline auto-injectors said that they could administer emergency medication during anaphylactic reactions before training, this percentage increased to 75% after training and remained at 61% 4–12 weeks after training.[11] Another study determined that school personnel were indecisive about recognizing the symptoms of anaphylaxis and administering adrenaline auto-injector before training; however, their skills in these areas improved significantly after training.[24] Another study, which only carried out a single training session, found that 11% of teachers said that they were ready for anaphylactic emergencies before training; however, this percentage increased to 88% after training.[11] Like those in the literature, this study's results showed that the food allergies and anaphylaxis management training increased the teachers' self-efficacy.

Conclusion

This study found that food allergies and anaphylaxis management training provided at schools effectively improved teachers' self-efficacy in managing food allergies and anaphylaxis. Regular training sessions on the management of food allergies and anaphylaxis should be offered to all school personnel, and protection and prevention policies concerning food allergies and anaphylactic reactions should be implemented in schools. Every school management should develop a comprehensive strategy for managing the risk of allergic reactions to food in children. It should involve a coordinated approach, strong leadership, and a special, comprehensive plan for managing food allergies. Nurses can provide regular training sessions on managing food allergies and anaphylaxis to all school personnel.

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Author Contributions

Author AY contributed to the intervention, data collection, data analysis, and manuscript preparation. Author MÖH contributed to the study design, intervention, data analysis, and manuscript preparation.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Statement

Permission has been obtained from the university ethics committee (approval no.4699-GOA-2019/12-45) and the provincial directorate of education. Later, verbal and written approval was obtained from the teachers.

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