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Original Article

The assessment of teachers' knowledge and schools'readiness about food allergy and anaphylaxis in a Northwest city of Turkey

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Abstract

Aim: To investigate teachers' knowledge and preparedness of schools about food allergy and anaphylaxis in elementary schools in Edirne city.

Material and Methods: The study was performed as a cross sectional survey study. Questionnaires were answered by 560 teachers, all of them were working in 35 public elementary schools in Edirne. In addition to questions concerning food allergies, teachers were asked about their attitudes in the case of a life-threatening food-induced allergic reaction. The presence of a nurse or other trained personnel, an action plan for management of anaphylaxis, and/or epinephrine availability and use in these schools in the case of such a reaction were also evaluated.

Results: The vast majority of teachers (97.3%) reported they had not been informed about food allergies, and only 19.1% stated that "shock" may be related to a food allergy situation. Only 4 schools (11.4%) employed a nurse. Examination of school drugs cabinets revealed no epinephrine in any school, and none of the students were found to carry epinephrine autoinjectors. Furthermore, none of the schools had an emergency action plan related to food-induced allergic reactions.

Conclusion: The current study revealed an urgent need to inform elementary school teachers of Edirne about food allergies and their treatment and to improve access to emergency treatments and action plans.

Keywords: Food allergy; school-age child; anaphylaxis; epinephrine; allergen avoidance; teachers; knowledge; readiness.

INTRODUCTION

Food allergies have gradually been increasing in developed countries. An 18% increase in food allergies was reported between 1997 and 2007 among school-age children in the United States of America (USA) (1). Genetic predisposition, environmental factors, dietary habits, and better control of early childhood infections all play a role in this increase (2). The prevalence of food allergies in school-age children is reported at 2-8% (3-6). Prevalence of parental reported food allergies among 1st-5th grade school children in Edirne is %7.5 (7).

Food allergy cases can admit to the hospital with many different clinical findings such as urticaria and allergic rhinitis. But the most feared is anaphylaxis. The probability of anaphylaxis being associated with food allergies in children is high (8,9). In a study, approximately 82% of such episodes occur in school-age children (10). Food allergy-related anaphylaxis can be seen both inside and outside the home. The school is one of the places where children spend time outside their home. Naturally, anaphylaxis may also develop in school. In the USA, 16-18% of children with food allergies are reported to experience reactions in school as a result of consuming foods which they are allergic to (11,12). Up to two-thirds of schools have at least one student at risk of anaphylaxis in Europe (13). Anaphylaxis may not develop only in children with known food allergy. The first anaphylactic reaction of children

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may develop at school. Sicherer et al (12) reported that 25% of the children with a peanut allergy experienced their first attack in school.

It is important to know about such a vital reaction, the level of knowledge of teachers who are responsible for the children in the school, and the readiness of schools for emergency allergic reactions. Thus, if a deficiency is completed, undesirable results can be prevented. The majority of studies on food allergies and management of anaphylaxis in schools have been performed in developed countries(11,14-16). In developing countries, such as Turkey, there have only been two studies which were related to knowledge of teachers and school staff about food allergy-induced anaphylaxis (17,18). The objective of this cross sectional study was to investigate the assessment of teachers' knowledge and preparedness of schools about food allergy and anaphylaxis in our city.

MATERIAL and METHODS

Participants

The current cross-sectional, descriptive study was performed by evaluating questionnaires answered by 560 teachers serving at all of 35 public elementary schools in Edirne city center. Edirne is is a city that located at the Greece and Bulgarian border of Turkey. All public elementary schools included the study but private schools were not included in the current study.

Verbal informed consent to participate was obtained from teachers agreeing to complete the study questionnaire. Ethical approval was obtained from the local ethical committee and permission was obtained from the Governor's Office and the Provincial National Education Directorate of Edirne before the study began.

Questionnaire forms

In the questionnaire, teachers were asked about subject matter classified into three groups: 1) their awareness of students with food allergies in their classes, including how they learned of these cases, the number of known cases, and the foods concerned; 2) their general knowledge regarding food allergies, such as the foods they thought were most responsible, the most common clinical findings, and whether they had received an education on food allergies; 3) the care and habits of teachers and school facilities regarding food allergies, including lunches provided by the school, knowledge on dealing with life-threatening food allergies, the existence of an emergency action plan, and the presence of individuals (e.g., a nurse) able to aid in such a situation. The questionnaires were distributed by a pediatric allergy and immunology fellow and a pediatric resident involved in the present study and were collected upon completion that same day. Following collection of questionnaires, any drugs contained in drugs cabinets and/or dispensaries of each school were examined, highlighting the presence of epinephrine ampoules or autoinjectors. Clinical and diagnostic workup of the students who were reported as "food allergic" was not the subject of this study.

Procedure

Questionnaires were distributed to 726 teachers; 658 of them agreed to complete the survey. Ninety-eight of 658 collected questionnaire form excluded due to lack of adequate information, 560 questionnaire form included to final evaluation.

Data analysis

All results were analyzed using the SPSS® (Statistical Package for the Social Sciences) 18 (SPSS Inc., Chicago, IL, USA) program. Categorical variables were described as number (percentages) while continuous variables were expressed as mean ± standard deviation (minimum-maximum).

RESULTS

Of the teachers who participated, 56.6% were female and 43.4% were male. The mean age of teachers was 40.6 ± 8.5 years (range, 21-59 years). The mean time in-practice was 16.1 ± 9.25 years (range, 1-42 years).

Table 1. Teachers' demographic characteristics and statements about their students with food allergy (n=560)

VARIABLE	SAMPLE POPULATION n (%)
Gender	
Female	317 (56.6)
Male	243 (43.4)
Age (year)*	40.6±8.5 (21-59)
How long have you been working as a teacher*	16.1±9.25 (1-42)
Do you have a student with food allergy in your class?	
Yes	39 (6.97)
Where were you informed from about your student's food allergy?	
Family statement	19(48.7)
Student statement	15(38.5)
Direct observation	5 (12.9)
Which kind of food(s) are your student is allergic to ?	
Egg	16(41)
Chocolate	9(23.07)
Cow milk	5(12.8)
Strawberry	5(12.8)
Other†	4(10.25)
Do your students are given lunch in your school?	
Yes	156(27.8)

*Mean±SD(Min-Max), † (honey, spice, fast food,crisps)

Table 2. Teachers' knowledge and opinions about food allergy (n=560)	
QUESTIONS/OPTIONS	**SAMPLE POPULATION N(%)**
Have you ever informed about food allergy ?	
No	545(97.3)
Yes	11(1.96)
Not answered	4(0.71)
How were you informed ?	
Internet	6
Books/Journals	4
Television	1
Do you think you need an education about food allergy ?	
Yes	532(95)
No	22(3.92)
Not answered	6(1.07)
In your experience, which is the most common food causing an allergic response in an individual?	
Egg	137(24.4)
Strawberry	29(5.17)
Chocolate	20(3.57)
Tomato	14(2.5)
Milk/milk products	13(2.32)
Foods with additives	13(2.32)
I don't know or n≤4 for any food	334(59.6)
Which symptom can be seen in an individual with confirmed food allergies during an acute allergic reaction? (choose the symptom among the symptoms are given below)	
Pruritus	492(87.9)
Rash	426(76.1)
Itchy eyes	342(61.1)
Emesis-vomiting	337(60.2)
Abdominal pain	280(50)
Diarrhea	237(42.3)
Shortness of breath	217(38.8)
Cough	193(34.5)
Runny nose	183(32.7)
Swelling of joints†	145(25.9)
Shock	107(19.1)
Bloody urine†	34(6.1)
What is the most common symptom seen in a patient with food allergies who is experiencing an acute reaction to a particular food ?	
Rash ‡	330(58.9)
Which of the following foods is safe to consume in a patient with a confirmed cow's milk allergy	
Apple*	345(61.6)
Do you read food labels ?	
Yes	471(84.1)
Which is the most critical section of a food label for a teacher to read as a precaution in caring for individuals with confirmed food allergies?	
Ingredients	279(49.8)
Other ¶	77(13.75)
Not answered	204(36.42)

† Options that unrelated with food allergy
‡ Rash was the correct answer
*Apple was the correct answer, other options were milk products
¶ (expiry date, calorie, storage conditions etc.)

Thirty-nine teachers (6.97%) declared they had students with food allergies in their classes; 19 teachers (48.7%) reported they became aware of students with food allergies "from the child's family," 15 (38.5%) were informed "by the student," and 5 (12.9%) found out "by observation of symptoms related food allergy." None of these students had history of anaphylactic reaction and their food allergy diagnosis were not confirmed. The foods reported to be the most responsible for food allergies of students in the participating elementary schools were eggs (41%), chocolate (23.1%), strawberries (12.8%), and cow's milk (12.8%). The number of teachers reporting students were provided lunch in their schools was 156 (27.8%). Demographic information is presented in detail in Table 1.

Teacher knowledge of food allergies

In total, 97.3% of teachers stated they had not received previous education on food allergies. Of the 11 (1.96%) who stated they received such education, 6 were educated via internet, 4 were via press/media, and 1 via television; 95% of teachers thought it was necessary to receive education about food allergies. The foods most commonly thought to lead to allergies were eggs (24.4%), strawberries (5.17%), and chocolate (3.57%). Only 19.1% of teachers stated that "shock" may be related to food allergies. In addition, findings unrelated with food allergy, such as swelling of joints and bloody urine, were linked with food allergies by 25.9% and 6.1% of teachers, respectively. Over half of teachers (58.9%) reported "rash" as the most common clinical finding related to food allergies. Teacher responses to questions are shown in Table 2.

Schools management of life-threatening allergic reactions

School nurses were present in only 4 (11.4%) of the 35 elementary schools. These schools were boarding schools and special schools for disabled students. None of the schools evaluated, including those with nurses, had epinephrine ampoules or autoinjectors or even emergency action plans. Other than schools with nurses, none of the other schools had trained personnel able to perform emergency interventions. In response to questions concerning their approach to a severe, life-threatening allergic reaction to food in school, 36.9% of teachers said, "I would try to transfer him/her to the nearest hospital." Only 2 (0.35%) teachers said their food allergic students carry drugs to help treat the possibility of any allergic reaction, which included antihistamines, while no students carried epinephrine auto injectors (Table 3).

Table 3. Attitudes of teachers and school facilities for the management of life threatening reactions due to food allergy

VARIABLE	SAMPLE POPULATION n (%)
What is your initial action in the case of a serious allergic rection ?	
I try to transfer him /her to the nearest hospital	207(36.96)
I have never been in a such situation	40(7.14)
I don't know	32(5.71)
Nothing	22(3.92)
I call 112 emergency service	21(3.75)
I notify his/her family	5(0.89)
I try to keep safe his/her airway	2(0.35)
I notify the school nurse	1(0.17)
Do you have a student who carries any medication for allergic reactions?	
No	524(93.57)
Yes †	2 (0.35)
The number of schools which are employing a nurse (Among 35 public elementary school)	4(11.4)
The number of schools which are epinephrine is available (auto enjector or ampoule)	0(0)
Is there an action plan to be used in the case of serious allergic reaction in your school?	
No	543(96.96)
Is there a trained school staff who can apply first intervention in the case of serious allergic reaction in your school?	
No	506(90.37)

† Antihistamines

DISCUSSION

We found that the teachers had low levels of knowledge about food allergy and anaphylaxis in this study. Most of them were not trained in food allergy or anaphylaxis and there was a great demand for training on this subject. The study also revealed that primary schools were unprepared for anaphylaxis in Edirne. Most schools did not have a nurse and an action plan for the emergency intervention and there was no epinephrine to be used in emergency situations. These findings emphasize the importance of providing education to teachers and making schools ready for anaphylaxis.

Having information about food allergy of a child allows not only to make proper dietary elimination but also to recognize and manage any life threatening allergic reaction as soon as possible. In our study, only 6.97% of teachers reported having students with food allergies in their classes. The parents reported less than half of the history of food allergy to the teachers. This result shows that parents do not provide adequate information to teachers.

The school is place where children spend most of their time at outside the home, and where they come into contact with various kinds of food. Among children with food allergy, 18% have experienced a reaction in school (11). The symptoms of an allergic reaction usually appear very rapidly, namely between 5 and 30 minutes following exposure to the allergen. It is important for teachers to recognize the reaction in this critical period. To be able to recognize the allergic reaction more quickly, the teachers should be trained on this subject. In our study 97.3% of teachers stated they had not received previous education on food allergies. Only 11 of them reported they had information about the subject, internet and booklets were most reported source of their knowledge. Ercan et al (18). reported 26.4% of teachers in public schools had previously been trained about anaphylaxis. This discrepancy may be due to difference in definition of the subject between two study (food allergy vs anaphylaxis). In this study, booklets and media were the most common sources of education. In another study, Urrutia-Pereira et al (19) reported, 28% of teachers had previously learned about anaphylaxis and food allergy. Similarily, social media was reported as the most common sources of education in these studies like in our study. Interestingly; study of Polloni et al (20) revealed that 63.6% of Italian teachers were educated about food allergy and anaphylaxis, 71.7% of them educated during the first aid courses. This result may a consequence of widespread organization of first aid courses in Italy. In our study, 95% of teachers thought it was necessary to receive education about food allergies. It is important for our teachers to have a high rate of willingness to receive education in this subject where there are serious gaps.

The most common foods causes food allergy in children are cow's milk, eggs, peanuts and hazelnuts (2). In our study, the foods reported to be the most responsible for food allergies of students in the participating elementary schools were eggs (41%), chocolate (23.1%), strawberries (12.8%), and cow's milk (12.8%). Ercan et al (18) also found that eggs, strawberries and milk were reported as the most common allergic foods by teachers. Despite cow's milk and eggs are most common cause of food allergies in the literature; chocolate and strawberries are often reported as cause of food allergy in Turkish studies (7,18) because they thought as important allergic foods in our society.

Various target organs can be affected by food allergies (e.g. the skin, gut, respiratory tract, and cardiovascular system). Skin is the most frequent involved organ in food allergy and anaphylaxis. In our study over half of teachers (58.9%) reported “rash" as the most common clinical finding related to food allergies but anaphylactic shock was linked to food allergy by only 19.1% of respondents. In the study of Urrutia-Pereira et al (19), 61% and 74,7% of the teachers correctly reported food allergy (such as urticaria, itching, stomach pain, wheezing, squeezethroat, collapse) and anaphylaxis (such as urticaria, stomach pain, breathing gasping) symptoms, respectively. In the study of Polloni et al (20) 90.8% of the teachers knew most of the frequent symptoms; and 81.9% were familiar with typical symptoms of anaphylaxis. Our results indicate that our teachers have deficiencies in recognizing food allergy and anaphylaxis.

In our country, except for private schools or boarding schools, there is usually no nurse in public schools. In our study, only 11.4% of the schools had school nurses. One in 10,000 children has an anaphylactic attack per year. Approximately 82% of such episodes occur in school-age children (10). Therefore, it is important to having health care personnel who can intervene in such situations in schools. Unfortunately our study revealed another worrying result; none of the schools had epinephrine which is the first drug to be used in anaphylaxis. Ozen et al (17) reported only 1% of 232 primary schools in Istanbul had epinephrine autoinjector. Avedissian et al (21) evaluated 59 schools in Lebanon and found that only 14% of schools had epinephrine to be used in emergency situations. In a study which evaluated the state of emergency preparedness of schools in the USA, 76% of school nurses stated that there are epinephrine autoinjectors in their schools (22). Nine out of 32 deaths associated with food allergies in the USA occur in schools, most commonly caused by delayed administration of life-saving epinephrine (23, 24). These findings are particularly worrying since it is reported that the first food-related anaphylaxis episode may occur at school. These results indicate that emergency preparedness of schools in developing countries are considerably low than developed countries.

Emergency action plan should be given to patients experienced an anaphylactic episode. Studies of developed countries have reported the percent of schools employing staff capable of performing emergency interventions and/or the presence of written emergency action plans varies from 16% to 86% (11,12,25,26). One study from

Turkey reported that 84% of teachers in Istanbul stated they had no written information that could be used as a guide for handling anaphylaxis in schools (17). Another study performed in private and public schools in Istanbul reported that only 6% stated that a plan of action for anaphylaxis was available in private schools, there was no action plan in any of the public schools (18). Allergy doctors have an important role in this regard.

Limitations

There were two limitations of the study. The survey was performed as based on teacher statements, none of the students reported as "food allergic" had undergone any allergy workup to definitive diagnosis. Furthermore, the surveys are subject to a number of measurements errors due to respondents such as failure to carefully read and answer the questions.

CONCLUSION

We found that teachers' level of knowledge about anaphylaxis was quite low and our schools are unprepared for anaphylaxis. In order to prevent undesired results, teachers should be informed about food allergies and anaphylaxis. In our schools, facilities should be provided to interfere with anaphylaxis.

The initial results of current study was presented as an oral presentation at the Food Allergy and Anaphylaxis Meeting in Venice, Italy, February 17-19, 2011. The abstract of oral presentation was published in Clinical and Translational allergy 2011(1):p043

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