

RESEARCH ARTICLE

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The Prevalence of Questionnaire Based Food Allergy in Adult Population of Eastern Blacksea Region of Turkey

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Abstract

Objective: Food allergy (FA) is an important public health problem which affects children and adults, its prevalence is increasing with the change of dietary habits in recent years. FA is a life-threatening allergic reaction which can lead to anaphylaxis and is very difficult to treat. In our study, we wanted to contribute to the literature by investigating the prevalence of FA in the Eastern Black Sea Region based on a questionnaire.

Methods: This study was planned as a cross-sectional web-based survey study. The questionnaire was prepared including 12 questions related with health problems that develop following food intake. Eastern Black Sea Region of Turkey was chosen as the target group of the study population. The questionnaire was published in local online and printed media during three months and the participants were allowed to fill it out.

Results: The study included 920 people (604 female, 316 male) who completed the questionnaire and 157 (17%) of the participants noted that they had food allergies. The most common allergen foods were spices (15%), tomatoes (10.9%), and cow's milk (7.5%). The most common symptoms were urticaria (63.5%), gastrointestinal symptoms (30.2%), rhinitis (15.1%), oral allergy syndrome (OAS) symptoms (11.3%). Young age ($p=0.004$), presence of atopic disease or family history of atopy ($p=0.001$) were found to be risk factors for the development of food allergy.

Conclusion: The prevalence of self-reported FA based on web-based survey in Eastern Black Sea residents is relatively high and specific to the region.

Key words: Adult, Epidemiology, Food Hypersensitivity, Prevalence, Questionnaire

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INTRODUCTION

FA occurs when foods are mistakenly perceived as foreign by the immune system and clinical symptoms appear that respond to it with different mechanisms. According to population-based studies conducted from various countries with different methodologies, 25% of people think that they are allergic to any food. (1). FA studies all over the world are mostly related to childhood. The data on the prevalence of FA in the adult age group are in a very wide range, such as 3-35% (2). Because, FA prevalence assessment is carried out with different methods in different countries. Double-blind placebo-controlled food challenge tests, which are accepted as the gold standard in the diagnosis of food allergy, are very laborious and are not recommended for population screening. Questionnaires prepared by considering the genetic, cultural and/or nutritional habits of the region are recommended for population screening (3). Based on the questionnaire formed in line with these recommendations, the prevalence of FA in adults was 14.7% in England, 16% in the USA and 12% in the Netherlands. In a European study, the lowest prevalence was found in Spain with 4.6% (2). In our country, the prevalence of FA was found to be 9.5%, according to a telephone survey study conducted only in the adult population of Istanbul province (4).

FA has become an increasing health problem in many countries. FA can affect multiple organ systems, cause widespread allergic reaction and anaphylaxis and has been associated with many specific clinical syndromes. Early detection and appropriate treatment of acute reactions not only saves lives, but also increases the quality of life of individuals. Data on food allergy are mostly related to childhood since it is observed more frequently in childhood and comprehensive studies evaluating FA in the adult population are not available in the world or in our country (5). In this study, it was aimed to determine the prevalence of FA in the adult population and to obtain data for the detection of food allergens specific to the Eastern Black Sea region.

METHODS

Patient Population

In the study, it was aimed to determine the prevalence of FA in the adult population in the Eastern Black Sea Region. This study was conducted as a prospective cross-sectional web-based survey between April 2014 and July 2014. Approval for this thesis was obtained from the local ethics committee. (Approval number: 2014/28, Approval date: 18.02.2014). All procedures performed in the present study were made in accordance with the ethical standards of the Helsinki Declaration (2008). In order to find out the prevalence of FA in the adult population in the Eastern Black Sea region, a questionnaire consisting of 23

questions was prepared by considering the genetic, cultural and/or nutritional habits of the region. General information about FA was put in the local online and printed media, and it was aimed to fill the questionnaire by individuals who are over the age of 18 and living in the Eastern Black Sea region. The questionnaire was filled in completely by the participants on a voluntary basis. Among the participants who filled out the questionnaire published in the local online media, the participants whose age and residence were not suitable were deemed invalid and the questionnaires of 920 individuals who met the necessary conditions were evaluated as valid.

Inclusion and Exclusion Criteria

Inclusion criteria: Individuals over the age of 18, individuals who can answer the survey questions. Exclusion criteria: individuals under the age of 18, individuals who cannot answer the survey questions.

Survey form

In the first 6 questions of our survey, patients were asked questions about their demographic characteristics such as name-surname, age, gender, smoking status, place of birth, place of residence and occupation. In order to detect the presence of additional allergic disease, the participants were asked whether they or their first-degree relatives had allergic disease. Participants who stated that they had an allergic disease were asked to state the allergic disease. Allergic rhinitis, conjunctivitis, asthma,

urticaria, angioedema, eczema, drug allergy was offered as options to the participants. The "other" option was offered to those who had other allergic diseases to specify. In the tenth question of the questionnaire, the question "Have you had any health problems with any food item?" was asked to the participants. While the questionnaires of the participants who answered "no" to this question were completed, additional questions were asked to the participants who answered "yes".

Statistical Method

Data from valid questionnaires were analyzed using PASW 18 (SPSS/IBM, Chicago, IL, USA). Descriptive statistics such as frequency distribution, mean and standard deviation were used to define the data. Categorical data were analyzed with "chi-square test" or "Fisher's Exact test". Continuous variables were checked for normality by using Kolmogorov Smirnov test and due to the related variable was non-parametric, the Mann-Whitney U test was performed to compare age of patients.

RESULTS

Web-based questionnaire was answered by 920 subjects voluntarily. The mean age of the study population was 38 ± 15 minimum 18 years and maximum 82 years. Of the participants, 316 (34.3%) were male and 604 (65.7%) were female. Among the 920 participants who filled out the questionnaire, who stated that they lived in the Eastern Black Sea Region, 19 resided in

Artvin, 44 in Trabzon and 862 in Rize. Detailed demographics are summarized in Table 1.

In order to determine the prevalence of FA in the adult population in which the Eastern Black Sea region was chosen as the target population, 158 (17%) of 920 people who filled out the questionnaire published in the local online media stated that they had food allergies. Among participants with food allergy, 104 (11.3%) of them stated that they were allergic to only one food, and 54 (5.8%) of them were allergic to more than one food.

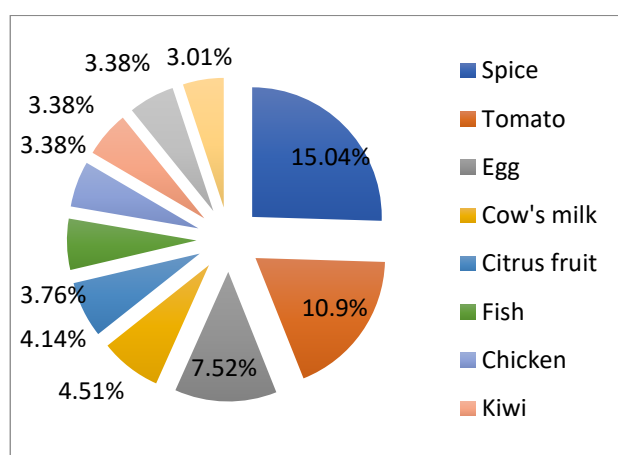


Figure 1. The most common reported foods as food hypersensitivity

Forty participants (15%) who filled out the questionnaire stated that they were allergic to spices which is the highest rate. In order of frequency, 29 participants (11%) had tomato allergy and 20 participants (7.5%) had egg allergy (Table3) (Figure 1). Allergic rhinitis was found to be the most common allergic

disease among individuals who filled out the questionnaire with 174 (18.9%). The second most common allergic disease reported by the participants was asthma and urticaria coexistence with 71 (7.71%), and the third most common allergic disease was eczema with 69 (7.5%). They are followed by asthma with 55 (6%), drug allergy with 46 (5%), and bee allergy with 28 (3%) individuals.

Of the 920 participants who filled out the questionnaire, 122 (13%) stated that they had more than one allergic disease. The most common comorbidities were stated as allergic rhinitis and conjunctivitis with 110 participants (12%). Participants were questioned that if there was an allergic disease in the first-degree relatives of the participants who filled out the questionnaire, 269 (29%) individuals stated that they had an allergic disease in their first-degree relatives.

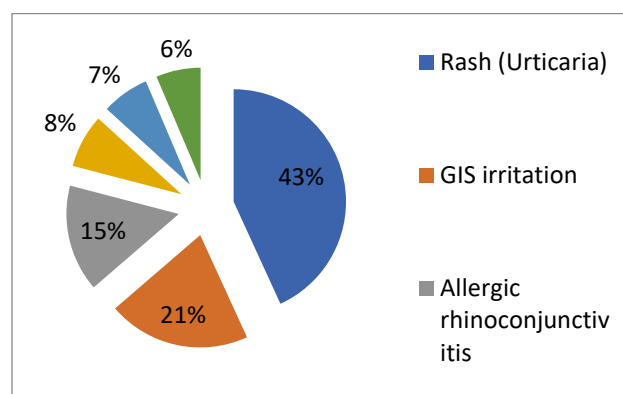


Figure 2. Self-reported symptoms and signs after food intake

The health problems experienced by the participants were, in order of frequency, skin rash, itching, redness (n=101, 63.9%), nausea-vomiting-abdominal pain-bloating (n=48,

Table 1. Demographic characteristics of the study population

Parameters		n	%
Gender	Female	604	65.7%
	Male	316	34.3%
City where they live	Rize	862	93.7%
	Trabzon	44	4.78%
	Artvin	19	2.06%
Occupation	Housewife	317	34.45%
	Self-employee	74	8.04%
	Student	117	8.04%
	Other	508	55.21%
Smoking history	Non-smoker	621	68%
	Ex-smoker	113	12%
	Smoker	186	20%

Table 2. Allergic diseases of the participants

Allergic disease	Number (n=338)	%
Allergic rhinitis	174	18.9
Asthma	71	7.71
urticaria-angioedema		
Eczema	69	7.5
Asthma	55	5.97
Drug allergy	46	5
Bee sting allergy	28	3.04

Table 3. Top ten food items that participants state they are allergic to food that has been reported

Allergens	Number of people	%
Spice	40	15.04
Tomatoes	29	10.90
Egg	20	7.52
Cow milk	12	4.51
Tangerine-orange	11	4.14
Fish	10	3.76
Chicken meat	9	3.38
Kiwi	9	3.38
Garlic	9	3.38
Veal	8	3.01

Table 4. Young age a risk factor

Allergic status	FA (+) (n=158)	FA (-) (n=762)	All patients (n=920)	P value
Age	38.96 (18-88)	41.2 (20-90)	38 (17-90)	0.004
Gender (female)n (%)	103 (65.1)	501 (65.7)	604 (65.7)	>0.05

DISCUSSION

This study is a survey-based study that reflects the prevalence of FA in the adult age group in the Eastern Black Sea region of Turkey. The questionnaire was filled by 920 participants between the ages of 18-88. As a result of the survey, the frequency of food allergies in adults in the region where the survey was conducted was found to be 17%, and it was determined that the frequency of allergy was more common in younger ages.

The frequency of FA has been increasing in recent years, especially in industrialized societies. There are many epidemiological studies on asthma, atopic dermatitis, and allergic rhinitis, however the number of studies on FA in our country and in the world are limited (5,6). As far as we know, there is not enough data on the prevalence of FA in our country. In the regional studies conducted in our country, the prevalence of FA was observed as 6.2% (7). FA is an immune response to certain foods or food additives. 90% of these reactions are caused by certain foods, such as milk, eggs, peanuts, fish, shellfish, soy and wheat (2,8). In our study, it was determined that there was more allergy to spices. When an allergic reaction develops against these foods, various reactions can be seen around the mouth and lips, ranging from itching to death. In our study, gastrointestinal irritation reactions such as dyspepsia and bloating were found to be more common than other reactions.

In many studies, prevalence of food allergies reported frequencies were quite different. In a multicenter cohort study, McBride et al. reported that the frequency of FA was between 5-30% (9). In other studies on the frequency of FA; with the survey method, Orhan et al. reported that 5.7% of 3500 school children aged 6-9 years in the Eastern Black Sea Region; Roehr et al. reported that 31.4% of 2354 children aged 0-17 years in Germany; Osterballe et al. reported that 16.6% aged 0-22 years (5, 10, 11).

In recent studies, the prevalence of FA in adults has been reported as 12-20% (12,13). In a multicenter study conducted in Europe, FA estimates differ significantly between countries and regions (14). The estimated prevalence was reported as 9.1.% in the United States, 8.3% in Canada. The diversity, methodological differences, demographic and cultural conditions related to dietary habits should be taken into consideration in the worldwide prevalence of food allergies (15).

Studies on the prevalence of food allergies are limited in Turkey, as in the rest of the world. The prevalence of FA was reported by Orhan et al. was 5.7% in school children aged 6-9 in the Eastern Black Sea region, and 9.4% in adults aged 18-80 in Istanbul by Gelincik et al. (4,5). As a result of our survey-based study of the prevalence of food allergies in the adult population of the Eastern Black Sea Region, 158 of 920 people who filled out the

questionnaire stated that they had food allergies. One of the reasons for this may be that the Eastern Black Sea is a closed society and there is a genetic predisposition to FA due to the frequent consanguineous marriages. In some studies, especially in children, male gender was associated with an increased risk (16,17). However, no relationship was reported between gender and the risk of food allergy (18). In studies conducted in Europe, increased age was found to be a risk factor in general (4,19). In our study, the average age of the participants who stated that they had FA was younger, and it was significantly different from the average age of those who did not state food allergy.

In many studies, the presence of allergic diseases or allergic sensitivity in parents or siblings has been reported as a strong risk factor for the development of food allergy (4,20,21). In our study, one third of the participants stated that their first-degree relatives had an allergic disease.

When the symptoms were evaluated, skin findings and nasal symptoms were prominent in our study in parallel with other studies (11,22). In the study, in which we took the adult population of the Eastern Black Sea Region as the target population; spices, tomatoes and eggs were found to be the most allergenic foods. In the Eastern Black Sea Region, where seafood is consumed frequently, fish allergy ranked sixth. (23). Regional eating habits and food preparation methods play an important role in

the prevalence of food hypersensitivity. In our study, tomato is in the 2nd place, egg is in the 3rd place. No parallelism was showed with the eating habits specific to the Eastern Black Sea Region. It is known that our country is an intensive hazelnut production region, but it is an interesting finding that hazelnut allergy is rare both in our study and in the study conducted by Orhan's et al. (5). The reason for this may be that although the production is high, the consumption is not parallel with this. In the study conducted by Gelincik et al. vegetables and fruits, especially eggs, tomatoes and strawberries, were found to be the most common allergenic foods. In the same study, cocoa was identified as another frequent nutrient (4). In our study, the most common allergens were found to be spices, eggs and tomatoes. The most common allergy-causing foods partially overlap with the allergic foods stated in other studies. In many studies, it is shown that there may be up to 30-fold differences between the declaration of individuals and the actual frequency of FA (9,22). Therefore, in order to determine the frequency of FA in our region, individuals with suspected FA should be evaluated with diagnostic methods such as oral food challenge and plasebo control double-blind oral challenge test in future studies.

The limitations of our study are that the questions in the questionnaire are not standardized, different age groups are included

and societies have different awareness and perceptions about diseases. Since there was no question about socioeconomic status in our questionnaire, the effect of socioeconomic status on the development of FA in the adult population of the Eastern Black Sea Region could not be evaluated. Another limitation of our study is that the diagnosis is not supported by laboratory methods. Another limitations are that our questionnaire is filled by people who lives in a few of cities in eastern region of black sea.

CONCLUSION

In our study we investigated the frequency of food allergy based on a questionnaire in our region and done out of every six people reported that they had FA. In survey studies, feedback rates can be 10 times higher than real FA rates. FA diagnostic methods costs are quite high and their implementations are difficult therefore making study of FA prevalence based on questionnaire and then implement diagnostic methods to individuals who said had a food allergy seems like a rational method.

Ethical Approval: Ethical approval was obtained for the study from the non-interventional clinical research ethics committee of Faculty of Medicine of Recep Tayyip Erdoğan University (Approval number: 2014/28, Approval date: 18.02.2014).

Peer-review: Externally peer-reviewed.

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