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Maternal Anxiety, Stress, and Depression: The Role of Food Allergy

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ABSTRACT

Objective: The prevalence of food allergy in children continues to rise worldwide. Both proven and suspected food allergy in children may be associated with depression, anxiety, and stress for mothers. In this study, our primary aim was to determine the severity of depression, anxiety, and stress in mothers of food allergic children and compare them with controls.

Materials and Methods: A questionnaire that included the sociodemographic features and independent risk factors and the depression, anxiety, stress scale 21 were used.

Results: A total of 104 patients, and their mothers were included in the study. Most patients were diagnosed with eczema. Multiple foods or food groups were eliminated by most patients. Moderate to severe depression ($p<0.001$), anxiety ($p<0.001$), and stress ($p=0.01$) were significantly more common in mothers of food allergic children compared with the control group. No association was found between the maternal anxiety, depression, and stress scores and the types of food allergy, income of the family, and the number of foods eliminated from the diet. There was a positive correlation between the maternal depression score and maternal education level ($p=0.029$, $r=0.21$).

Conclusion: The mother and baby should be considered as an inseparable whole and the mothers should be supported psychosocially. Psychosocial problems in the mothers of food allergic children should be detected in a timely manner by screening programs.

Keywords: Food allergy, mothers, stress, anxiety, depression

INTRODUCTION

The prevalence of food allergy in children continues to rise worldwide (1,2). There is no ideal treatment for food allergy and the main treatment remains avoidance of allergic foods. Food allergy is associated with more stress, anxiety, and deterioration in health-related quality of life for both the patients and family as it may cause dietary and lifestyle changes for family. It may also cause potentially life-threatening conditions for patients (3,4). Both proven and suspected food allergy in children has been associated with increased anxiety of the mothers (1,2).

Mothers often take more responsibility than the fathers for their children's food allergy (5). Mothers are often alone in the management of food allergy and are unsupported when trying to ensure their children's safety regarding allergy and maintain an adequate quality of life (5). Social support to mothers is particularly important for health outcomes, and could act as a buffer against their stress, depression, and anxiety (6). Although it has been shown in many studies that food allergy may cause stress and/or anxiety in mothers, the stress, anxiety, and depression of mothers have not evaluated at the same time. The severity of these conditions in mothers of food allergic children has not been compared to mothers of healthy children. In this study, our primary aim was to determine the severity of depression, anxiety, and stress in mothers of food allergic children. We also aimed to compare the depression, anxiety, stress scores and severity of mothers with food allergic children to mothers of healthy children.

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MATERIAL and METHODS

Study Design and Participants

The study was carried out at the 'Pediatric Allergy and Asthma Department'. A total of 104 mothers, whose children were diagnosed with food allergy and who were followed up at and visited our department at least two times, were included in the study (the food allergy group). A total of 90 mothers of healthy children who presented at the general pediatric outpatient clinic for a routine physical examination were recruited as the control group. Ethical approval was obtained from the local ethics committee and written informed consent was taken from all participants**.** The mothers who could speak Turkish and read, and who had no physical or medical problems for completing the questionnaire were included in the study. Mothers diagnosed with psychiatric disorders, mothers who were illiterate, and those who had children with chronic diseases other than food allergies, or had other concomitant allergic diseases were not included in the study. This study was conducted between April 1, 2021 and August 1, 2021.

Questionnaire

A questionnaire consisting of 16 questions that included the sociodemographic characteristics of the participants and the independent risk factors were used for data collection (7-10). The minimum wage (without tax deduction) was based on data from the Turkish government in 2021.

Depression, Anxiety, Stress Scale 21 (DASS 21)

The DASS 21 was used to measure the mothers' depression, stress, and anxiety. Its validity and reliability have been proven in international and national studies. The Turkish adapted version was used (11-13). This scale may be used to measure depression, anxiety, and stress for screening purposes. A higher score obtained from each of the depression, anxiety and stress scales shows a higher risk. In this scale, there are seven separate questions (21 questions in total) to measure the level of depression, stress, and anxiety. The scale consists of a four-point Likert-type scale; 0 "not suitable for me", 1 "sometimes suitable for me", 2 "usually suitable for me" and 3 "completely suitable for me". According to the scores obtained, the severity of stress, anxiety and depression ranges from normal to very severe. In our study, we classified the severity of stress, depression, and anxiety in the patients as normal, mild, and moderate to very severe.

Evaluation of Food Allergy

Food allergies were evaluated in all patients with a detailed history of food allergy, prick test results and if necessary, gold standard provocation tests (14).

Statistical Analysis

The software package SPSS, version 18, was used for statistical analysis. Descriptive statistics were shown with the median for numerical non-normally distributed variables and the mean for normally distributed variables. Ratios or percentages were used for categorical variables. Whether the variables conformed to the normal distribution or not was evaluated with visual (histogram and probability graphs) and analytical (Kolmogorov Smirnov/Shapiro-Wilk tests) methods. The chi-square test (χ^2) was used for comparing categorical variables. The Student t test was used for the comparison of normally distributed numeric variables, and the Mann-Whitney U test was used for comparison of non-normally distributed numerical variables between the groups. The Spearman correlation analysis was used to evaluate the relationship between non-normally distributed and ordinal variables.

RESULTS

A total of 104 patients (food allergic group) and 90 healthy children (control group) and their mothers were included in the study. The characteristics of the patients diagnosed with food allergy and their mothers are shown in Table I. Most of the patients were diagnosed with eczema. Most patients had eliminated multiple foods or food groups.

The median follow-up period of the patients was 8 (3-166) weeks. Four of the participants (3.8%) had additional wheezing and one (0.9%) had a diagnosis of allergic rhinitis. None of them had any additional chronic disease.

The comparison of the sociodemographic status of mothers with food allergic children (group 1) and the mothers of healthy children (control group) is shown in Table II. There was no difference between the groups in terms of maternal education level, monthly income of the family, and the age of the children and mothers (Table II).

The comparison of the depression, anxiety and stress severity of the mothers in the two groups is shown in Table III. Moderate to very severe depression ($p<0.001$), anxiety ($p<0.001$), and stress ($p=0.01$) were significantly more

Table I: Characteristic features of the patients.

Characteristic features		Results
Age of the patients (months), median (min- max)		7 (0.5-20)
Sex, n (%)	Female	59 (56.7%)
	Male	45 (43.3%)
Food allergy types, n (%)	Proctocolitis	29 (27.9%)
	Acute enterocolitis	2 (1.9%)
	Chronic enterocolitis	4 (3.8%)
	Eczema	46 (44.2%)
	Anaphylaxis	11 (10.6%)
	Urticaria-Angioedema	6 (5.8%)
	Proctocolitis and eczema	3 (2.9%)
	Other	3 (2.9%)
The number of foods eliminated from the diet*, n (%)	One	27 (26%)
	Multiple	77 (74%)

*Foods are grouped as dairy products, egg, meat, fish, vegetables, fruits, and cereals. Multiple food eliminations are determinant eliminating more than one food group.

Table II: The comparison of the sociodemographic status of the food allergic and control groups.

Parameters	Group 1 (Mothers of food allergic children) (n=104)	Control group (Mothers of healthy children) (n=90)	Test statistics	p
Maternal education level				
Primary school, n (%)	10 (9.6)	10 (11.1)	χ^2=1.099 df=3	0.77
Secondary school, n (%)	9 (8.7)	11 (12.2)		
High school, n (%)	29 (27.9)	26 (28.9)		
University, n (%)	56 (53.8)	43 (47.8)		
Monthly income of the family*				
Minimum wage and below, n (%)	37 (35.6)	39 (43.3)	χ^2=1.025 df=1	0.31
Above the minimum wage, n (%)	67 (64.4)	51 (56.7)		
Age of the patients (months), median (min-max)	7 (0.5-20)	8 (1.5-24)	z=-1.09	0.27
Age of the mothers (years), mean±standard deviation	30±4.7	32 ±4.8	t=-0.51	0.507

* Minimum wage and below <3500 Turkish Lira.

common in the mothers of food allergic children than the control group (Table III).

The comparison of the depression, anxiety and stress scores of the two groups is shown in Table IV. The mean depression (p<0.001), anxiety (p<0.001) and stress (p<0.001) scores in group 1 were significantly higher than in group 2.

The association between maternal depression, anxiety, and stress scores in the food allergic group and the characteristic features are shown in Table V. No association was found between maternal depression, anxiety, and stress scores and the food allergy types of the patients (eczema, proctocolitis, urticaria/angioedema, anaphylaxis), the income of the families, and multiple food elimination diets.

Bivariate analyses between independent factors and the maternal depression, anxiety, stress scores are seen in Table VI. There was a positive correlation between the maternal depression score and maternal education level (p=0.029, r=0.21).

Table III: Comparison of the severity of depression anxiety, and stress of the food allergic and control groups.

	Group 1 Mothers of food allergic children					Group 2 Control Group Mothers of healthy children					Test statistics	p
	Normal	Mild	Moderate	Severe	Very severe	Normal	Mild	Moderate	Severe	Very severe		
Depression n (%)	39 (37.5)	14 (13.4)	31 (29.8)	9 (8.7)	11 (10.6)	62 (68.9)	9 (10)	10 (11.1)	7 (7.8)	2 (2.2)	χ^2=22.6 df=4	<0.001
Anxiety n (%)	33 (31.7)	19 (18.3)	14 (13.5)	10 (9.6)	28 (26.9)	54 (60)	19 (21.1)	10 (12.2)	4 (4.4)	3 (3.3)	χ^2=27.3 df=2	<0.001
Stress n (%)	37 (35.6)	23 (22.1)	18 (17.3)	13 (12.5)	13 (12.5)	52 (57.8)	20 (22.2)	9 (10)	5 (5.5)	4 (4.4)	χ^2=13.1 df=4	0.01

Table IV: Comparison of the depression, anxiety and stress scores of the groups.

	Group 1 Mothers of food allergic children (n=104)	Group 2 Control Group Mothers of healthy children (n=90)	p
Depression score mean±standard deviation	6.8±4.7	4.2±3.9	<0.001
Anxiety score mean±standard deviation	6.9±4.9	3.4±3.01	<0.001
Stress score mean±standard deviation	9.2±5.2	5.2±4.6	<0.001

Table V: Comparison of patient and parent characteristics.

Food allergy type		Depression score Mean ± standard deviation	p	Anxiety score Mean ± standard deviation	p	Stress score Mean± standard deviation	p
Proctocolitis	Yes, n=29	6.9±4.1	0.33	7.6±4.7	0.31	10±4.9	0.83
	No, n=75	6.7±4.9		6.4±4.9		8.8±5.2	
Eczema	Yes, n=46	6.6±5	0.71	6.7±5.2	0.52	8.4±5.3	0.14
	No, n=58	6.9±4.4		7.2±4.6		9.9±5	
Anaphylaxis	Yes, n=11	6.8±5.9	0.96	6±4.5	0.57	9.5±6.5	0.86
	No, n=93	6.8±4.6		7±4.9		9.1±5.1	
Multiple elimination*	Yes, n=77	7.2±4.8	0.53	6.9±4.9	0.87	9.8±5.6	0.42
	No, n=27	6.6±4.7		6.8±4.8		8.9±5	
Minimum wage and below monthly income of family**	Yes, n=37	5.7 ±3.5	0.1	6.6±4.3	0.65	8.2±5.2	0.16
	No, n=67	7.3±5.2		7.1±5.2		9.7±5.1	

*Foods are grouped as dairy products, egg, meat, fish, vegetables, fruits, and cereals. Multiple food eliminations are determinant eliminating more than one food group. ** Minimum wage and below <3500 Turkish lira.

Table VI: Interaction of independent factors with depression, anxiety, stress scores.

		Age of the mothers	Age of the patients	Follow-up period	Maternal education level
Depression score***	r	-0.05	0.1	0.14	0.21
	p	0.56	0.28	0.146	0.029*
Anxiety score***	r	-0.15	0,07	0.12	0.13
	p	0.88	0.45	0.19	0.15
Stress score***	r	-0.12	0.03	0.09	0.12
	p	0.208	0.75	0.34	0.196

*Statistically significant.

DISCUSSION

Food allergy may cause a negative impact on the parents' mental health. There are many studies in the literature that have separately evaluated depression, stress, or anxiety in the mothers of food allergic children. In this study we wanted to evaluate all these mental states in the mothers of food allergic children and compare the results with the mothers of healthy children.

Mothers often take more responsibility than fathers for their children's food allergy (4, 5). Mothers do not receive adequate support for problems related to food allergy such as food safety, diet, and maintaining an adequate quality of life (5). Therefore, our study was conducted on mothers. Food allergies may cause a negative impact on the parents' social life. It has been stated that food allergies are associated with higher levels of parental stress (7). Also, food allergy may cause anxiety and depression in the parents (9). Sicherer et al. have reported that food allergy causes a significant negative impact on the families' emotional status, and social activities (3). Knibb and Semper reported that a third of 124 parents with food allergic children had mild to severe anxiety and almost a fifth of them had mild to moderate depression (15). We found that mothers of food allergic children had moderate to severe depression, anxiety, and stress more commonly than the mothers of healthy children in this study. As a result, we believe that food allergies are associated with more severe maternal stress, anxiety, and depression.

Mandell et al. have determined that there could be changes in the anxiety of the mothers and children as the age of the food allergic children increased. The most severe anxiety was found in mothers with children aged 6-11 years. Also, they stated that children could have to take more responsibility when they started school and this could increase the stress of the parents (5). Beken et al. found no association between the anxiety of the mothers and the age of the food allergic children on presentation (7). Lau et al. found no association between maternal anxiety and the age of the food allergic children (10). We found no relationship between the age of the children and the depression, anxiety, and stress scores of the mothers. Our patients were less than two years of age. Our thesis needs to be supported by studies that include more homogeneous age groups.

No correlation has been found between the maternal age and the maternal STAI trait and state anxiety scores in various studies conducted on food allergic children (7,10). Our results were consistent with the literature. The mothers were faced with depression, anxiety, and stress due to the food allergy in their children, regardless of their age.

In a study that included food allergic children aged 0-2 years, no association was found between maternal anxiety and the number of foods eliminated from the diet (7). In another study conducted in children with nut allergy, no relationship was found between the maternal anxiety scores and the number of foods eliminated from the diet (10,11). In another study, it was shown that the number of foods eliminated from the diet could impair the family's quality of life (7). We think the number of foods eliminated from the diet had no effect on the mental health of the mothers.

The mothers of food allergic children may learn more about food allergy after the diagnosis, and their fear and anxiety may decrease (16,17). In another study, no relationship was found between the follow up period of food allergic children and the anxiety of the mothers (12). We found no relationship between the follow up period of the patients and the mental health of the mothers. Our study was a cross-sectional and questionnaire-type study. This issue should be evaluated with prospective studies for more accurate results.

Beken et al. and Lau et al. have found no correlation between the maternal education level and maternal anxiety in their studies that were conducted on food allergic children (7,10). The maternal education level had no effect on maternal health except depression. Highly educated mothers are not more stressed or anxious because of their children's food allergy, but appear to be slightly prone to depression.

The food allergy types of children may have an impact on the mother's anxiety. In a study evaluating 92 children with food allergies, anaphylaxis was diagnosed in six (6.5%) of the patients. No correlation was found between anaphylaxis and the anxiety of the mothers (7). In most studies in the literature, it has been determined that the families of children with anaphylaxis were more anxious (5,10,18). This thesis was not supported in our study. Our study was cross-sectional and the number of patients diagnosed with anaphylaxis was relatively low. This issue should be evaluated with population-based studies involving large numbers of patients with anaphylaxis.

Beken et al. have found no association between anxiety of the mothers with food allergic children and the children's types of food allergy (7). Lau has found that

mothers of children with food allergy and eczema were more anxious (10). No association was found between the maternal depression, anxiety, and stress scores and the food allergy types of the patients in the present study. There are few studies in the literature that can guide us to comment about this issue. More studies are needed to clarify the association between the type of food allergy and the maternal mental health.

The Limitations of Our Study;

Our study was a cross-sectional study. We think that prospective studies may better reflect the changes in depression, anxiety, and stress of the mothers over time. The mothers were evaluated with screening questionnaires. A complete psychiatric examination that included the mothers' history and detailed tests was not performed. We cannot exclude the possibility that the food allergy could influence the psychological states of other family members and the patients.

CONCLUSION

Mothers of food-allergic children may have depression, anxiety, and stress at different rates. They may also experience more severe anxiety, depression, and stress than mothers of healthy children. Some of the increased mental health problems seen in mothers of food-allergic children may be adaptive and associated with increased maternal concern. The mother and baby should be considered as an inseparable whole and mothers should be supported psychosocially. Also, psychosocial problems in mothers with children with food allergies should be detected in a timely manner by screening programs.

Authorship Contributions

Concept: **Ahmet Kan, Mehmet Türe,** Design: **Ahmet Kan, Gülnur Baş,** Data collection or processing: **Ahmet Kan, Mehmet Türe, Kamil Yılmaz,** Literature search: **Ahmet Kan, Emre Emre, Gülnur Baş, Kamil Yılmaz,** Writing: **Ahmet Kan, Mehmet Türe, Gülnur Baş, Emre Emre,** Approval: **Ahmet Kan.**

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