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Quality of life in children with food allergies, psychiatric symptoms, and caregiving burden of their mothers

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Abstract
Objective: The present study aimed to evaluate the quality of life in children with food allergies, the accompanying depression and anxiety disorders, and caregiving burden of their mothers.
Material and Methods: A total of 168 children with food allergy visiting our clinic and their mothers were included in the study group. The control group included 152 children who visited the healthy child follow-up clinic of our hospital and their mothers. Studying mothers' opinions, the Food Allergy Quality of Life Questionnaire Parent Form (FAQLQ-PF) was used for evaluating children, and the Beck's Depression Inventory, Beck's Anxiety Inventory, Temperament Evaluation of Memphis, Pisa, Paris, San Diego Auto-questionnaire, and Zarit Caregiver Burden Scales were used for evaluating mothers.
Results: No differences were noticed between the study and control group regarding mean age and gender distribution ($P > 0.05$). In the study, the FAQLQ-PF total and subscale scores of children with food allergies were determined according to the opinions of their mothers, and scores tended to increase with age ($P < 0.0001$). In addition, it was determined that mothers of children with food allergies had higher levels of anxiety, depression, and caregiving burden than mothers of the control group ($P < 0.0001$).
Conclusion: In order to develop a multidisciplinary approach for children with food allergies, we conceived as appropriate to inform their families about the difficulties of caregiving and psychosocial disorders that could develop over time. They also must be informed to take preventive measures as well as the medical aspects of their children's disease.

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Introduction

Although the prevalence of food allergy varies between 5% and 10%, an increase in its numbers is observed in recent years.[1] Generally, the treatment of food allergy consists of removing the responsible food from the diet, prescribing an epinephrine auto-injector, giving an anaphylaxis action plan, and responding to the reactions.[2] However, despite these precautions, shopping for groceries, cooking of meals, and preparing snacks become challenging. Families avoid eating out because the ingredients are not fully listed on food packages and the prevailing risk of contamination with allergic food.[3] For this reason, regardless of the pathophysiological mechanisms of food allergy, the health-related quality of life (HRQL) of the child with food allergy and the family was reported to decrease, compared to the control group.[4-7] Also, elimination allergic food could cause restrictions in daily and social activities, change in diet, and social isolation of both child and family. It was reported that these changes in the lifestyle of the family and child cause stress, anxiety, and depression, especially in case of caregiving mothers.[5,7-12] After the child was diagnosed with food allergy, the mother asked, ''What should I eat, what should I feed my child?''. Along with the daily routine care of children, mothers bear the burden of various chores, including the careful reading of labels on food products and taking care of contamination with allergenic items in a variety of settings. The only difference between food allergy and other chronic diseases is that health status of patient's with food allergy is generally good during the periods of no reaction. However, the sudden and life-threatening severity of allergic reactions and the dependence of children with food allergy on their mothers increase the burden of caregiving on mothers.[5,13-15]

The present study proposed to evaluate the quality of life in children aged 0 – 12 years, who were followed up for food allergy, and the accompanying depression and anxiety disorders, and the caregiving burden of their mothers.

Materials and methods

Participants

The study included children with immunoglobulin E (IgE)-mediated food allergy and aged 0–12 years visiting the Pediatric Allergy Immunology Clinic, and their mothers. Children aged 0–12 years, who had applied to the healthy child follow-up clinic of our hospital, and their mothers were included in the control group. In the healthy pediatric outpatient clinic; children were vaccinated, age-appropriate nutrition education was provided, and their growth and development were monitored. Children with syndrome, malignancy, metabolic diseases, immunodeficiency, chronic heart disease, and endocrine, kidney, lung, gastrointestinal, liver, and central nervous system diseases were not included in the study and control groups. In addition, children were not included in the study and control groups if any of their family members had a chronic disease. Children with severe/uncontrolled allergic diseases were also not included to the study group. The study group children were diagnosed with IgE-mediated food allergy by a pediatric allergy consultant according to any of the following criterion: a positive food challenge test with a positive skin test and/or positive specific IgE; a convincing history of severe allergic reaction supported by (based on highly predictive) evidence of sensitization to the triggering food according to current guidelines; children having suffered anaphylaxis in the past 6 months.[16,17] Written informed consent was obtained from the parents of all the children enrolled in the study. The study was approved by the Ethics Committee of Fırat University of Medical School (No.121-2021).

Questionnaires

Food Allergy Quality of Life Questionnaire (FAQLQ)

Food Allergy Quality of Life Questionnaire for children was developed by Dunn Galvin et al,[18] and the Turkish validity and reliability study of the scale was conducted in 2018.[19] The original questionnaire had 14 questions meant for children aged ≤ 4 years, 26 questions for children aged 4–6 years, and 30 questions for children aged 7–12 years. Each category of questionnaire had the following three subscales: Emotional Impact (EI), Food Anxiety (FA), and Social and Dietary Limitations (SDL). The subscale score was calculated by adding up the raw scores of each item and dividing by the number of items. The total score (TS) was calculated according to the total scores of the subscales and divided by 3. The total score range was 0–6. Lower scores indicated better quality of life. The FAQLQ had two forms: Parent Form (PF) and Children Form (CF). The FAQLQ-PF allowed parents to report their child's HRQL from a parent's perspective and assessed both limitations in child's life and negative emotions caused by daily dietary restrictions.

Food Allergy Independent Measure (FAIM) Form

The food Allergy Independent Measure (FAIM) form was originally developed to assess the construct validity of FAQLQ. FAIM consists of six questions, scored 0–6. Four of these questions assessed child's food allergy expectation outcomes, and the other two reflected aspects of the perceived severity of food allergy. Higher scores indicated poor HRQL. FAIM also had two forms: Parent Form and Children Form.[20]

Beck's Depression Inventory (BDI)

The BDI scale was developed by Beck et al.[21] It measured emotional, cognitive, and motivational symptoms of depression. The cut-off point of the scale, for which Turkish validity and reliability studies were conducted, was accepted as 17.[22] The scale had 21 questions, each of which was scored as 0–3. The final scores obtained were evaluated as follows: 1 – 10: normal; 11 – 16: moderate mood disorder; 17-20: clinical depression; 21-30: moderate depression; 31-40: serious depression; and 41–63: severe depression.

Beck's Anxiety Inventory (BAI)

Beck et al. developed BAI scale in 1988.[23] It was used to determine the frequency of anxiety symptoms experienced by individuals. Its Turkish validity and reliability study was also conducted.[24] The scale consisted of 21 items scored as 0–3. The final scores obtained from the scale were evaluated as follows: a score of 0–7 indicated low anxiety, 8–15 indicated mild anxiety, 16–25 indicated moderate anxiety, and 26–63 indicated a high level of anxiety.

Temperament Evaluation of Memphis, Pisa, Paris, and San Diego Autoquestionaire (TEMPS-A)

The TEMPS-A Temperament Scale was developed by Akiskal et al.[25] and was designed to evaluate the dominant affective temperament in individual. Its Turkish validity and reliability study was also evaluated.[26] The Turkish version consisted of 99 items and aimed to determine depressive, hyperthymic, irritable, cyclothymic, and anxious temperaments. If the score obtained from each subtype was above the cut-off point, it was assumed that the individual had that dominant temperament. If more than one temperament had exceeded the cut-off point, then presence of more than one dominant temperament was considered.

Zarit Caregiver Burden Scale (ZCBS)

Zarit et al. developed this scale in 1980 to evaluate the stress experienced by caregivers of individuals in need of care.[27] Its Turkish validity and reliability study was also evaluated.[28] The scale included mental tension and disruption in private life, limitations and restrictions, deterioration in social relations, economic burden, and dependency. The scoring range was 22–110, with the following evaluations: scores 22–46 were considered a light burden, scores 47–55 were considered a moderate burden, and scores 56–110 were considered as a severe burden.

Statistical Analysis

Statistical analysis was performed by using SPSS version 22.0 (IBM, Armonk, NY, USA). Descriptive statistics were expressed as median (minimum–maximum), n, and percentage (%). Non parametric tests were used because the data distribution was not equal. Mann-Whitney U and Kruskal Wallis variance analyses were performed from non-parametric tests. Post hoc and Dunn Bonferroni tests were used for comparisons. The relationship between Spearman's correlation coefficient and two independent variables was examined. Chi-square and Pearson correlation tests were applied for categorical variables, and $P < 0.05$ was considered statistically significant.

Results

A total of 187 children with food allergy and their mothers were included in the study group. In addition, 164 healthy children and their mothers were included in the control group. In all, 168 mothers in the study group and 152 mothers in the control group completed the study. The most allergic foods were cow's milk (57.1%), eggs (54.8%), hazelnuts (10.7%), and walnuts (7.1%). Details of allergic foods are given in Table 1. The age of onset of ailments in children with food allergy in the study group was 6 (3–15) months, and the follow-up period in the clinic was 8 (2–98) months. In addition, 26 (15.5%) children had a history of anaphylaxis with food (Table 2).

The study group comprised 100 (59.5%) boys, and the mean age was 17.5 (7–130) months. The control group had 79 (52%) boys, and the mean age was 18 (6–132) months. No differences were noticed between the study and control groups in terms of mean age and gender distribution ($P > 0.05$). The mean age of the mothers in the study group was 27 (19–41) years, and the same in the control group was 27.5 (20–40) years. No statistical difference was observed between the groups in terms of disease, number of children in the family, number of persons in the family, household income, mother's marital status, and mother's chronic disease ($P > 0.05$). However, a statistically significant difference was discovered in terms of mother's employment status and her education level ($P < 0.05$) (Table 3).

The FAQLQ-PF scores were evaluated in according with the opinions of mothers of children with food allergy, and discovered that TS and EI, FA, SDL scores tended to increase with child's age ($P < 0.0001$) (Table 4). A positive correlation was observed between FAQLQ-PF total score, subscale scores, and FAIM–Parent Form (FAIM-PF) score.

Table 1 Type of foods causing allergic symptoms.

Allergic foods	*n* (%)
Cow's milk	96 (57.1)
Egg	92 (54.8)
Hazelnut	18 (10.7)
Walnut	12 (7.1)
Meat	10 (6)
Sesame	10 (6)
Peanut	8 (4.8)
Fish	8 (4.8)
Lentil	8 (4.8)
Soy	7 (4.1)
Pistachio	6 (3.6)
Tomato	6 (3.6)
Potato	6 (3.6)
Pumpkin	6 (3.6)
Cocoa	6 (3.6)
Wheat	4 (2.4)
Chicken meat	4 (2.4)
Carrot	4 (2.4)
Chickpea	4 (2.4)
Pea	2 (1.2)
Banana	2 (1.2)
Orange	2 (1.2)
Strawberry	2 (1.2)
Sunflower seed	2 (1.2)

Table 2 Clinical features of children with food allergy.

Parameters	Results
Age at onset of food allergy symptoms (months)	6 (3-15)
Duration of food allergy (months)	11 (3-119)
Duration of follow-up for food allergy (months)	8 (2-98)
Children's age group (years), *n* (%)	
0-3	140 (83.3)
4-6	14 (8.3)
7-12	14 (8.3)
Number of allergic foods, *n* (%)	
1 food	84 (50)
2 foods	54 (32.2)
3 foods	14 (8.3)
≥ 4 foods	16 (9.5)
Type of symptoms, *n* (%)	
Skin	144 (85.7)
Respiratory tract	82 (48.8)
Gastro intestinal tract (GIT)	20 (11.9)
Others	10 (6)
History of anaphylaxis, *n* (%)	
Yes	26 (15.5)
No	142 (84.5)
Epinephrine autoinjector prescription, *n* (%)	
Yes	119 (70.8)
No	49 (29.2)
Concomitant allergic disease, *n* (%)	
Atopic dermatitis	108 (64.3)
Asthma	58 (34.5)
Allergic rhinitis	28 (16.7)
Sibling allergy	
Yes	16 (9.5)
No	152 (90.5)

Table 3 Sociodemographic characteristics of food allergy and control groups.

Parameters	Food allergic children (n: 168)	Healthy children (n: 152)	*P* value
Gender, *n* (%)			
Boy	100 (59.5)	79 (52)	0.178
Girl	68 (40.5)	73 (48)	
Children's age (months)	17.5 (7-130)[a]	18 (6-132)	0.773
Mother's age (years)	27 (19-41)	27.5 (20-40)	0.536
No. of children in family, *n* (%)	2 (1-6)	2 (1-5)	0.097
No. of persons in family, *n* (%)	4 (3-10)	4 (3-7)	0.072
Mother's marital status, *n* (%)			
Married	152 (90.5)	138 (90.8)	0.924
Single	16 (9.5)	14 (9.2)	
Mothers with chronic disease, *n* (%)			
Yes	19 (11.3)	14 (9.2)	0.584
No	149 (88.7)	138 (90.8)	
Mother's psychiatric treatment, *n* (%)			
Yes	20 (11.9)	16 (10.5)	0.726
No	148 (88.1)	136 (89.5)	
Mother's education level, *n* (%)			
Primary school	40 (23.8)	37 (24.3)	**0.022**
Secondary school	27 (16.1)	9 (5.9)	
High school	60 (35.7)	45 (29.6)	
University	41 (24.4)	61 (40.1)	
Mother's employment status, *n* (%)			
Housewife	112 (66.7)	71 (46.7)	**0.001**
Self-employment	25 (14.9)	36 (23.7)	
Officer employed	31 (18.5)	45 (29.6)	
Family income, *n* (%)			
<$300	11 (6.5)	31 (20.4)	0.372
$300-450	20 (11.9)	17 (11.2)	
$450-650	75 (44.6)	23 (15.1)	
$650-750	30 (17.9)	30 (19.7)	
>$750	32 (19)	51 (33.6)	

[a]Median (minimum-maximum).

The BDI ($P < 0.0001$) and BAI ($P < 0.0001$) scores of the mothers in the study group were observed to be significantly higher than that in the control group. Likewise, depressive ($P = 0.001$) and anxious ($P < 0.0001$) temperament characteristics were observed to be higher in the study group than in the control group. In addition, mothers of children with food allergies had a higher caregiver burden (CB) than mothers of healthy children ($P < 0.002$) (Table 5).

A positive correlation was observed between mother's BAI and depression, anxious, cyclothymic temperament characteristics (Table 6). Although, a positive correlation was discovered between mother's BDI, BAI, and sibling allergy, no relationship was observed between the concomitant allergic disease in a child with food allergy and a history of anaphylaxis. Likewise, no correlation was discovered between mother's caregiver burden and concomitant with allergic disease in a child with food allergy, history of anaphylaxis, and sibling allergy.

According to the reports of mothers of children with food allergy, a positive correlation was observed between FAQLQ-PF total scores and children's age, and age groups, mother's age, duration of food allergy, duration of follow-up for food allergy, number of allergic foods, concomitant allergic disease in a child with food allergy and history of anaphylaxis. In addition, a positive correlation was discovered between children's scores of FAQLQ-PF subscales (EI, FA, and SDL scores) and children's age and age groups, duration of food allergy, duration of follow-up for food allergy, number of allergic foods, concomitant allergic disease in a child with food allergy, and history of anaphylaxis (Table 6).

No relationship was observed between BDI, BAI, and caregiver burden in mothers and milk, egg, hazelnut, and walnut allergy in children. Although a positive correlation was observed between FAQLQ-PF total and subscale scores and milk and egg allergy in children, no correlation was observed with children's hazelnut and walnut allergy.

Table 4 Distribution of total and subscale scores of FAQLQ-PF scale in children with food allergy aged 0–3, 4–6, and 7–12 years.

Parameters	0–3 years	4–6 years	7–12 years	*P* value
FAQLQ-PF[a]				
Total score	2.5 (1.6–35)[b]	3.5 (3.3–3.8)	3.7 (3.5–4.0)	<0.0001
Subscales				
Emotional impact	2.1 (1.2–3.0)	3.3 (3.0–3.5)	3.3 (3.0–3.6)	<0.0001
Food anxiety	2.6 (1.7–3.5)	3.6 (3.4–4.0)	3.9 (3.8–4.3)	<0.0001
Social and dietary limitations	3.0 (2.1–4.1)	3.4 (3.2–3.7)	3.6 (3.5–3.8)	<0.0001

[a]FAQLQ-PF: Food Allergy Quality of Life Questionnaire-Parent Form.
[b]Median (minimum–maximum).

Table 5 Comparison of depression, anxiety, temperament types, and caregiver burden of mothers in both groups.

Parameters	Food allergic children (n: 168)	Healthy children (n: 152)	*P* value
Depressive temperament	6 (1–20)[a]	5 (0–17)	**0.001**
Cyclothymic temperament	5 (0–16)	5 (0–16)	0.085
Hyperthymic temperament	8 (0–18)	9 (0–19)	0.068
Irritable temperament	2 (0–10)	1.5 (0–11)	0.201
Anxious temperament	6 (0–23)	5 (0–22)	**<0.0001**
Beck's depression inventory	8 (0–38)	4 (0–21)	**<0.0001**
Beck's anxiety inventory	7.5 (0–32)	4 (0–41)	**<0.0001**
Zarit caregiver burden scale	44 (24–71)	39 (22–66)	**0.002**

[a]Median (minimum–maximum).

Correlation analysis was not performed because the number of other food allergies was relatively low.

Discussion

Food Allergy is a disease characterized by low mortality and predominance of psychological symptoms. Avoiding allergic foods and living in a fear of an allergic reaction affect the daily lives of children with food allergies and their families.[7,29] For this reason, it is important to evaluate FAQLQ in children with food allergies. However, since young children do not have language skills and cognitive abilities to self-report manifestations, parental reporting is used.[18,30] FAQLQ can be evaluated with both FAQLQ-PF and FAQLQ-CF, and a good correlation existed between FAQLQ-PF and FAQLQ-CF.[31] The HRQL of children with food allergies were compared with chronic diseases, such as other atopic diseases, insulin-dependent diabetes (DM), gastrointestinal, and rheumatological diseases. It was reported that children with food allergies have lower HRQL than children with chronic diseases.[4,6,7,29,32] Avery et al. compared the quality of life of children with DM and peanut allergy, and reported that although DM is a chronic debilitating disease, children allergic to peanuts had a worse HRQL.[4]

According to parents' observations, it was reported that children with food allergies had worse HRQL levels.[31,33–35] Marklund et al.[33] discovered that HRQL reported by parents of children with food allergies was impaired regardless of the type of food allergy and additional allergic disease. The authors concluded that this relationship was dependent on the presence of food allergy and taking the associated elimination measures, rather than the severity of the food allergy. In addition, HRQL in children with food allergies, affected less in children aged <3 years; however, HRQL worsened in older children with increasing age.[31,34,35] When the parameters affecting HRQL in children with food allergies were evaluated, it was determined that HRQL levels had worsened in children with a history of anaphylaxis and cow's milk allergy,[34,35] multiple food allergies,[29,31,36] additional allergic disease,[35] and a sibling with allergic disease.[31,35]

In the present study, the FAQLQ-PF total score subscale was determined according to the reports of the mothers of children with food allergy. It was observed that FAQLQ-PF total scores tended to increase with age. Children aged <3 years completely depend on their parents for nutrition and are not aware of the elimination any food for food allergy. We think that increasing awareness, efforts to be independent, starting school, and social restrictions in children with increasing age resulted in worsened HRQL scores. Likewise, in the present study, a positive correlation was discovered between FAQLQ-PF total scores and milk allergy, egg allergy, duration of food allergy, duration of follow-up for food allergy, number of allergic foods, concomitant allergic disease in children with food allergies, and the history of anaphylaxis. These findings suggested that the quality of life of children with food allergies was affected by the duration of the elimination of allergic diet and the fear of severe allergic reactions that would develop with accidental ingestion of allergic food. In addition, it indicated the importance that elimination diets should only be practiced for a required length of time. Likewise, increase in food allergies and allergic diseases in children ensued families paying more attention to managing such conditions and, consequently resulting in limited social integration and increasing psychological impacts on affected families and children.

Although food allergy affects complete family, stress and anxiety levels are perceived higher in mothers than in other family members, because mothers often take more responsibility than others in managing their children's food allergies and have to bear the pressure of their children's health and safety.[9,37] King et al.[9] evaluated the quality of life, anxiety, and stress levels in families of children with peanut allergies, and reported that mothers experienced more anxiety and stress than other family members.

Table 6 Correlation between anxiety, depression, caregiver burden, and children's food allergy quality of life according to mothers' opinions in food allergy group.

Characteristics	BDI	BAI	ZCBS	FAQLQ-TS	FAQLQ-EI	FAQLQ-FA	FAQLQ-SDL
Children's age	r = -0.041	r = -0.086	r = -0.005	**r = 0.351**	**r = 0.324**	**r = 0.369**	**r = 0.224**
	P = 0.600	P = 0.270	P = 0.953	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**	**P = 0.004**
Children's age group	r = 0.003	r = -0.065	r = 0.025	**r = 0.642**	**r = 0.641**	**r = 0.645**	**r = 0.474**
	P = 0.968	P = 0.402	P = 0.746	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**
Mother's age	r = 0.061	r = -0.076	r = -0.027	**r = 0.162**	r = 0.132	**r = 0.157**	r = 0.130
	P = 0.435	P = 0.328	P = 0.732	**P = 0.036**	P = 0.088	**P = 0.043**	P = 0.092
Age at onset of food allergy symptoms	r = -0.045	r = -0.109	r = -0.082	r = 0.146	**r = 0.159**	**r = 0.157**	r = 0.116
	P = 0.562	P = 0.161	P = 0.289	P = 0.059	**P = 0.039**	**P = 0.042**	P = 0.134
Duration of food allergy	r = -0.017	r = -0.087	r = -0.002	**r = 0.356**	**r = 0.332**	**r = 0.372**	**r = 0.223**
	P = 0.828	P = 0.260	P = 0.981	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**	**P = 0.004**
Duration of follow-up for food allergy	r = -0.018	r = -0.081	r = 0.003	**r = 0.332**	**r = 0.296**	**r = 0.353**	**r = 0.209**
	P = 0.816	P = 0.296	P = 0.967	**P < 0.0001**	**P < 0.0001**	**P < 0.0001**	**P = 0.007**
No. of children in family	r = 0.081	r = -0.063	r = 0.011	r = 0.134	r = 0.103	r = 0.129	r = 0.111
	P = 0.297	P = 0.420	P = 0.888	P = 0.083	P = 0.183	P = 0.097	P = 0.151
No. of persons in family	r = 0.100	r = -0.016	r = 0.006	r = 0.048	r = 0.019	r = 0.038	r = 0.032
	P = 0.195	P = 0.837	P = 0.936	P = 0.537	P = 0.806	P = 0.629	P = 0.681
Number of allergic foods	r = -0.057	r = -0.063	r = 0.032	**r = 0.243**	**r = 0.233**	**r = 0.248**	**r = 0.155**
	P = 0.465	P = 0.420	P = 0.684	**P = 0.001**	**P = 0.002**	**P = 0.001**	**P = 0.044**
Mother's education level	r = -0.082	r = 0.048	r = 0.087	r = -0.060	r = -0.088	r = -0.071	r = -0.039
	P = 0.293	P = 0.534	P = 0.265	P = 0.438	P = 0.255	P = 0.363	P = 0.615
Mother's employment status	r = -0.126	r = -0.085	r = 0.084	r = 0.065	r = 0.043	r = 0.057	r = 0.103
	P = 0.105	P = 0.273	P = 0.279	P = 0.403	P = 0.580	P = 0.467	P = 0.182
Family income	r = 0.0001	r = 0.117	r = 0.056	r = -0.105	r = -0.128	r = -0.105	r = -0.091
	P = 0.995	P = 0.130	P = 0.472	P = 0.174	P = 0.098	P = 0.177	P = 0.240
Depressive temperament	r = -0.050	**r = 0.218**	r = -0.013	r = -0.015	r = -0.056	r = -0.008	r = -0.011
	P = 0.520	**P = 0.005**	P = 0.864	P = 0.846	P = 0.472	P = 0.921	P = 0.890
Cyclothymic temperament	r = -0.009	**r = 0.277**	r = -0.020	r = -0.108	r = -0.096	r = -0.099	r = -0.094
	P = 0.913	**P < 0.0001**	P = 0.800	P = 0.165	P = 0.217	P = 0.203	P = 0.226
Hyperthymic temperament	r = -0.046	r = -0.130	r = -0.059	r = 0.085	r = 0.109	r = 0.094	r = 0.094
	P = 0.554	P = 0.094	P = 0.451	P = 0.272	P = 0.160	P = 0.225	P = 0.227
Irritable temperament	r = 0.005	r = 0.090	r = 0.019	r = -0.115	r = -0.133	r = -0.109	r = -0.109
	P = 0.954	P = 0.247	P = 0.808	P = 0.136	P = 0.086	P = 0.156	P = 0.197
Anxious temperament	r = 0.091	**r = 0.196**	r = 0.043	r = -0.033	r = -0.065	r = -0.032	r = -0.024
	P = 0.243	**P = 0.011**	P = 0.577	P = 0.674	P = 0.399	P = 0.682	P = 0.755
Beck's depression inventory	-	r = -0.063	r = -0.029	r = -0.064	r = -0.063	r = -0.057	r = -0.080
		P = 0.416	P = 0.706	P = 0.408	P = 0.419	P = 0.460	P = 0.303
Beck's anxiety inventory	r = -0.063	-	r = -0.044	r = 0.063	r = 0.069	r = 0.054	r = 0.087
	P = 0.416		P = 0.573	P = 0.419	P = 0.377	P = 0.491	P = 0.260
Zarit caregiver burden scale	r = -0.029	r = -0.044	-	r = -0.071	r = -0.056	r = -0.070	r = -0.085
	P = 0.706	P = 0.557		P = 0.359	P = 0.472	P = 0.364	P = 0.273

BDI: Beck's depression inventory, BAI: Beck's anxiety inventory, ZCBS: Zarit caregiver burden scale, FAQLQ-PF: Food Allergy Quality of Life Questionnaire-Parent Form, FAQLQ-PF TS: FAQLQ-PF total score, FAQLQ-PF EI: FAQLQ-PF emotional impact, FAQLQ-PF FA: FAQLQ-PF food anxiety, FAQLQ-PF SDL: FAQLQ-PF social and dietary limitations, FAIM-PF: Food Allergy Independent Measure-Parent Form.

Many studies reported that the mental health of mothers of children with food allergies was adversely affected and are more stressed and/or anxious compared to mothers of children without food allergy.[5,7,9-12,36,38,39] It was reported that mothers of children with food allergies had increased levels of depression and anxiety.[7,10,39] In contrast, Goodwin et al.[40] determined no significant difference in anxiety or depression levels between parents of children with and without food allergies. However, Birdi et al.[39] reported that parents of children with food allergies experienced more stress, anxiety, and depression than the control group, regardless of the type of food allergy diagnosed. Knibb and Semper[10] reported that one-third of parents of children with food allergies experienced mild to severe anxiety, and almost one-fifth experienced mild to moderate depression. Some studies reported increased anxiety levels in the parents of children with a history anaphylaxis with food allergy and eczema[12,30,37] Mandell et al. determined that maternal anxiety levels changed with increse in the age of children with food allergies.[37] The most severe anxiety was observed in mothers of children aged 6–11 years having food allergy. The authors also stated that children's

going to school increased responsibility of parents, which could increase their stress levels. However, few studies discovered no relationship between the anxiety levels of mothers of children with food allergies and child's present age, child's age at diagnosis, duration of follow-up, number of allergic foods, history of anaphylaxis, and type of allergenic foods.[12,38]

The present study established that mothers of children with food allergies had higher levels of anxiety and depression than mothers in the control group. However, we discovered no relationship between depression and anxiety levels in mothers of children with food allergies and their clinical and demographic characteristics. These results demonstrated that increased levels of anxiety and depression in mothers of children with food allergies were related to the primary disease, independent of clinical and demographic characteristics. Likewise, when the mothers of children with food allergies were compared to the mothers of the control group, it was discovered that depressive and anxious temperament characteristics were higher in the present study. It was reported in the previous studies that temperament features were the basis of mood disorders and that dominant temperamental characteristics in individuals predispose them to mood disorders.[41,42] Having certain temperamental characteristics in mothers of children with food allergies could be considered as a precursor of psychological reactions and comorbid psychiatric diseases that might develop together.

Mothers of children with food allergies defined parenting as taking care of a child "living at risk".[43] An increased burden of care was reported by parents of children with food allergies due to increased workload and potential for serious reactions, risk of accidental exposure to allergic food, and unforeseen threats.[5,13,15,44] Also, children with food allergies having a history of using adrenaline auto injectors because of anaphylaxis, multiple food allergies,[13,15,45] and concomitant allergic diseases[14,45] increase parents' burden of care. It was also discovered in the present study that mothers of children with food allergies had a greater caregiver burden than mothers of healthy children. In line with these results, we conceived it as useful to apply measurement tools that evaluate caregivers to prevent their early exhaustion while careing allergic children. In light of the obtained data, family support services for mothers could act as a buffer against possible caregiver burden, depression, and anxiety.

Strength and limitations

The positive aspects of the present research were the presence of study and control groups, validity and reliability of Turkish questionnaires, and diversity of the scales used. However, inability to use structured interview techniques, presence of individual perceptions and differences, and lack of data, such as the knowledge levels of parents about the disease, could be listed as general limitations of the study. Likewise, lack of some objective burden variables (e.g., distance from the treatment center, social support of caregiver, assistant caregiver, sleep pattern and quality, etc.) could be listed as other limitations. The present study included only children with IgE-mediated food allergies, hence it could not be representative of children with non-IgE-mediated food allergies and their mothers.

Conclusion

According to mothers of children with food allergies, FAQLQ-PF total and subscale scores tended to increase with age. Likewise, although not at a level of clinical diagnosis, it was discovered that mothers' anxiety and depression levels increased and their caregiver burden was higher in the study group, compared to the control group. In order to develop a multidisciplinary approach for children with food allergies, it would be appropriate to inform their families about the difficulties of caregiving and psychosocial disorders that could develop over time. The parents also must be informed about the preventive measures that could be taken as well as the medical aspects of children's disease.

Conflict of interest

The authors declared no potential conflict of interest with respect to research, authorship, and/or publication of this paper.

Author contributions

The authors confirm their contributions to the paper as follows: Nülüfer Kılıç, Şuheda Kaya, and Mehmet Kılıç: study conception and design; Nülüfer Kılıç and Şuheda Kaya: data collection; Nülüfer Kılıç, Şuheda Kaya, Gülay Taşçı, Filiz Özsoy and Mehmet Kılıç: analysis and interpretation of results; Nülüfer Kılıç, Şuheda Kaya, Gülay Taşçı, and Filiz Özsoy: preparation of draft manuscript. All authors reviewed the results and approved the final version of the manuscript.

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