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Depression, anxiety, and quality of life levels in mothers of children with IgE-mediated food allergy and food protein-induced allergic proctocolitis

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Abstract

Background: Childhood food allergies are known to cause various psychosocial disorders in parents and caregivers. The aim of this study is to determine the levels of depression, anxiety, and quality of life in mothers whose children have IgE-mediated food allergy or food protein-induced allergic proctocolitis (FPIAP).

Methods: Mothers of children under 5 years of age with IgE-mediated food allergy or FPIAP and healthy children of the same age were administered the Beck's Depression Inventory (BDI), State-Trait Anxiety Inventory (STAIT-TRAIT), and the Short Form for Quality of Life Measurement-36 (SF-36).

Results: A total of 126 mothers were included in the study: Forty-two each in the IgE-mediated group, the FPIAP group, and the healthy control group. Mothers in the IgE-mediated group and FPIAP group had higher depression and STAIT anxiety scores than mothers in the control group (Both p-values are <0.001, and the eta squared values were 0.364 and 0.555, respectively). TRAIT anxiety scores of mothers in the IgE-mediated group were significantly higher than mothers in both the FPIAP group and the control group (Both p-values are <0.001, and the eta squared value was 0.641). Role limitations because of physical health, role limitations because of emotional health, energy/fatigue, emotional well-being, social functioning, and general health scores of mothers in the IgE-mediated group were lower than mothers in the control group (All p-values are <0.001, and the eta squared values were 0.185, 0.197, 0.626, 0.592, 0.274, and 0.342, respectively).

Conclusion: Mothers of children with both IgE-mediated food allergy and FPIAP may experience higher rates of depression and anxiety disorders, as well as decreased quality of life. Mothers of children with IgE-mediated food allergies experience more psychosocial disorders than mothers of children with FPIAP.

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Introduction

Food allergy is defined as “immune responses that can recur after exposure to an allergenic food” and affects 8% of children worldwide.¹ Generally, the main foods responsible for food allergies are milk, eggs, peanuts, tree nuts, soy, wheat, sesame, fish, and shellfish.² Food allergic reactions are divided into two main groups: IgE-mediated (type 1 hypersensitivity reactions) and non-IgE-mediated (cell-mediated reactions), but they can also occur in combination.¹ Many studies have revealed the need for families to be constantly vigilant and take precautions to prevent their children from coming into contact with allergens and delaying treatment.³ These precautions complicate the daily lives of individuals and their families, particularly limiting social interactions and dietary habits.⁴ The resulting parental problems can include subjective anxiety, guilt, sadness, fatigue, embarrassment, anger, and rage, as well as objective concerns such as time demands, family friction, disruption to social life, and financial concerns.³ The aim of this study is to determine the levels of depression, anxiety, and quality of life in mothers whose children have IgE-mediated food allergy or FPIAP.

Methods

Study group

The study included mothers of children under 5 years of age diagnosed with IgE-mediated food allergy and FPIAP who presented to the Pediatric Immunology and Allergy Diseases Outpatient Clinic of Istanbul Başakşehir Çam and Sakura City Hospital, University of Health Sciences. The study was cross-sectional in design. Children diagnosed with food allergy and their mothers were included in the study between January 2024 and June 2024. Mothers of healthy children under 5 years of age were included as the control group. Mothers with chronic or atopic diseases were excluded from both the patient and control groups. A questionnaire was completed detailing the demographic data of the mothers and the children with food allergies. Complete blood counts, total IgE levels, skin prick test results, serum-specific IgE levels, stool blood analysis results (for FPIAP), and food provocation test results were obtained from the electronic files of all patients with food allergy. Only mothers of patients whose food allergy was confirmed by a food provocation test were included in the study.

Scales

Mothers completed Beck Depression Inventory (21 multiple-choice questions), State Anxiety Inventory (STAI-S) (20 multiple-choice questions on a 4-point scale—how a person feels at a specific moment in time), Trait Anxiety Inventory (STAI-T) (20 multiple-choice questions on a 4-point scale—how a person feels anxiety over time), and short form-36 (SF-36) (36 multiple-choice questions). In the BDI scoring, cutoff values were considered as follows: 0-9 for minimal depression, 10-16 for mild depression, 17-29 for moderate depression, and 30-63 for severe depression. The lowest

possible total score on the State Anxiety Scale is 20, and the highest total score is 80. A high score indicates a high level of anxiety, while a low score indicates a low level of anxiety. A total score of 0-19 on the scales indicates no anxiety, a total score of 20-39 indicates mild anxiety, a total score of 40-59 indicates moderate anxiety, and a total score of 60-79 indicates severe anxiety, while a total score of 60 and above indicates that the individual needs professional help.^{5,6} Beck depression envanteri. Available from 25112014164858-10-BECK-DEPRESYON-ENVANTERI.pdf. Accessed 10 January 2024. Öner, N. ve Le Compte, A. (1998). *Sürekli Durumluk/Süreklilik Kaygı Evanteri El Kitabı*. (2.Basım). İstanbul: Boğaziçi Üniversitesi Yayınevi. In this study, Turkish validated versions of the BDI, STAI, and SF-36 scales were used.^{6,7,8} (Öner, N. ve Le Compte, A. (1998). *Sürekli Durumluk/Süreklilik Kaygı Evanteri El Kitabı*. (2.Basım). İstanbul: Boğaziçi Üniversitesi Yayınevi., Hisli N, Beck Depresyon Evanteri'nin geçerliliği üzerine bir çalışma. *Psikoloji Dergisi*, 1988; 6:118-122, Sağlık Bilimleri Üniversitesi Ankara Bilkent Şehir Hastanesi, Acil Tıp Kliniği). Koçyiğit H, Aydemir Ö, Fişek G, Ölmez N, and Memiş AK. Form-36 (KF-36) 'nın Türkçe versiyonunun güvenilirliği ve geçerliliği. *İlaç ve tedavi dergisi*. 1999;12(2):102-6. All questionnaires were completed by the mothers themselves in both the patient and control groups. Participants were divided into three groups: mothers of children with IgE-mediated food allergies (Group 1), mothers of children with FPIAP (Group 2), and mothers of healthy children (Group 3). Beck Depression Inventory scores were compared among three groups (IgE-mediated food allergy, non-IgE-mediated food allergy, and control) using one-way ANOVA. The alpha error probability was accepted as 0.05. With a total sample size of 126 participants (42 in each group), the power for the median effect size (Cohen's $f=0.25$) was approximately 70%. Statistical comparisons were then made between these groups.

The study received ethics committee approval from the Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee, dated October 25, 2023, numbered KAEK/25.10.2023.494. Following ethics committee approval, written informed consent was obtained from all mothers included in the study.

Statistical analyses

Data analyzed in the study were processed using the SPSS 21.0 package program. Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess normal distribution. Between-group comparisons were performed using chi-square analysis for categorical data. The Pearson chi-square test was used to determine group differences in categorical variables, and Fisher's exact test was used when values in some cells were below 5. Distributions of categorical variables were examined by calculating proportions and percentages. One-way analysis of variance (ANOVA) was used to determine differences between continuous variables with a normal distribution in more than two groups. The Kruskal-Wallis H test was used in the presence of continuous variables with a nonnormal distribution in more than two groups. Post-hoc analysis was performed to determine the differences between groups in multiple group comparisons. In post-hoc analysis, the Tukey test

was used for ANOVA, and the Tamhane test was used for Kruskal-Wallis. Data were evaluated at a 95% confidence interval. A p-value of <0.05 was considered statistically significant for all parameters. The eta-squared test was used for effect size. Values such as 0.01 were considered small effect size, values such as 0.06 were considered medium effect size, and values greater than 0.14 were considered strong effect size. Multiple linear regression analysis was performed to determine the factors affecting the variables within the SF-36. When evaluating the results, a correlation coefficient (r) of 0.0 was considered no linear relationship, between 0.01 and 0.29 as weak correlation, between 0.30 and 0.70 as moderate correlation, between 0.71 and 0.99 as strong correlation, and 1.0 as perfect correlation. A p-value of <0.05 was considered statistically significant for all parameters.

Results

Demographics of children with IgE-mediated food allergy

Of the children with IgE-mediated food allergy included in the study, 28 (66.7%) were boys and 14 (33.3%) were girls. The median age of onset of food allergy in children with IgE-mediated food allergy was 6 months, and the median age at diagnosis was 6.5 months. Twelve (28.6%) of the patients had a family history of atopy. Twenty-two (52.4%) patients had a single food allergy, while 20 (47.6%) patients had multiple food allergies. Thirty-six (85.7%) of the children with IgE-mediated food allergy had egg allergy, and 24 (57.1%) had cow's milk allergy. Of the children with IgE-mediated food allergy, 40 (95.2%) had concomitant skin involvement, 22 (52.3%) had anaphylaxis, 16 (38.1%) had concomitant gastrointestinal involvement, and 16 (38.1%) had concomitant respiratory involvement. The most common clinical findings were urticaria-angioedema in the skin, shortness of breath in the respiratory system, and vomiting in the gastrointestinal system (Table 1).

Demographics of children with FPIAP

Of the children with FPIAP included in the study, 22 (52.4%) were boys and 20 (47.6%) were girls. The median age of onset of food allergy in children with FPIAP was 2.5 months, and the median age at diagnosis was 4 months. Twelve (28.6%) of the patients had a family history of atopy. Twenty-four (57.1%) patients had a single food allergy, while 18 (42.9%) patients had multiple food allergies. Thirty-three (85.7%) of the children with FPIAP had cow's milk allergy, and 24 (57.1%) had egg allergy. Forty-two (100.0%) of the children with FPIAP had bloody or mucous stools (Table 2).

Maternal demographics

A total of 126 mothers were included in the study: Forty-two each in the IgE-mediated group, the FPIAP group, and the control group. The median age of mothers in the IgE-mediated group was 29 years (min-max: 23-42), the

Table 1 Demographics of children with IgE-mediated food allergy.

	n (%)
Age of diagnosis, median (min-max), months	6.5 (2-20)
Age of symptom onset, median (min-max), months	6 (1-47)
Gender, male	28 (66.7)
Concomitant atopic disease	
Recurrent wheezing	8 (19.0)
Allergic rhinitis	12 (28.6)
Atopic dermatitis	12 (28.6)
Drug allergy	5 (11.9)
Familial atopy	12 (28.6)
Type of food allergen	
Hen's egg	36 (85.7)
Cow's milk	24 (57.1)
Tree nuts	9 (21.4)
Peanuts	3 (7.1)
Soy	7 (16.7)
Fish	2 (4.8)
Lentil	1 (2.4)
Wheat	1 (2.4)
Number of allergen	
Single	22 (52.4)
Multiple	20 (47.6)
Skin	40 (95.2)
Urticaria-angioedema	21 (50.0)
Erythema	34 (81.0)
Pruritis	30 (71.4)
Rash around the mouth	17 (41.5)
Atopic dermatitis	12 (28.6)
Gastrointestinal system	16 (38.1)
Vomiting	8 (19.0)
Food refusal	2 (4.8)
Abdominal pain	2 (4.8)
Perianal redness	5 (11.9)
Constipation	3 (7.1)
Abdominal discomfort	2 (4.8)
Diarrhea	4 (9.5)
Respiratory system	16 (38.1)
Shortness of breath	11 (36.2)
Cough	7 (16.7)
Runy nose	5 (11.9)
Wheezing	4 (9.5)
Stridor	1 (2.4)
Anaphylaxis	22 (52.3)
Eosinophilia (>4.0)	30 (71.4)
Eosinophil level, median (min-max) (%)	4.85 (0.5-31.6)
Serum IgE elevation	9 (21.4)
Serum IgE level, median (min-max), IU/mL	145 (3.8-12561)
Total	42 (100.0)

median age of mothers in the FPIAP group was 29 years (min-max: 23-40), and the median age of mothers in the control group was 31 years (min-max: 21-49). There were no statistically significant differences between the patient and control groups in terms of age, education level, or maternal employment status ($p=0.085, 0.194, \text{ and } 0.765,$

respectively) (The Chi-square test was used for group comparisons) (Table 3).

Comparison of mothers' depression and anxiety scores

Mothers in both patient groups had higher depression and STAIT anxiety scores than mothers in the control group

(Both p values are <0.001, and the eta squared values were 0.364 and 0.555, respectively). Mothers in the IgE-mediated group had higher TRAIT anxiety scores than mothers in both the FPIAP and control groups (Both p values are <0.001, and the eta squared value was 0.641). In addition, mothers in the FPIAP had higher TRAIT scores than mothers in the control group (p<0.001, and the eta squared value was 0.641) (One-way ANOVA test was used to compare the groups) (Table 4).

Table 2 Demographics of children with food protein-induced allergic proctocolitis.

	n (%)
Age of diagnosis, meiyang (min-max), months	4 (1-30)
Age of symptom onset, median (min-max), months	2.5 (1-7)
Gender, male	22 (52.4)
Concomitant atopic disease	
Recurrent wheezing	7 (16.7)
Atopic dermatitis	8 (19.0)
Familial atopy	12 (28.6)
Type of food allergen	
Hen's egg	33 (85.7)
Cow's milk	24 (57.1)
Number of allergen	
Single	24 (57.1)
Multiple	18 (42.9)
Gastrointestinal system	42 (100.0)
Bloody mucus stools	42 (100.0)
Perianal redness	18 (42.4)
Food refusal	4 (9.5)
Diarrhea	21 (50.0)
Abdominal discomfort	16 (38.1)
Constipation	2 (4.8)
Abdominal pain	12 (28.6)
Vomiting	9 (21.4)
Eosinophilia (>%4.0)	22 (52.4)
Eosinophil, median (min-max) (%)	3.8 (0.8-14.5)
Serum IgE elevation	0 (0.0)
Serum IgE level, median (min-max), IU/mL	14.8 (0.2-431)
Total	42 (100.0)

Comparison of mothers' quality of life

Mothers in the IgE-mediated group had lower scores for role limitations because of physical health, role limitations because of emotional health, energy/fatigue, emotional well-being, social functioning, and general health compared to mothers in the control group (All p-values are <0.001, and the eta squared values were 0.185, 0.197, 0.626, 0.592, 0.274, and 0.342, respectively). Role limitations because of emotional health, energy/fatigue, emotional well-being, social functioning, pain, and general health scores of the mothers in the FPIAP group were lower than those of the mothers in the control group (p <0.001, <0.001, <0.001, <0.001, 0.028, and <0.001, respectively and the eta squared values were 0.197, 0.626, 0.592, 0.274, 0.056 and 0.342, respectively). Physical functioning and role limitations because of physical health scores of the mothers in the IgE-mediated group were lower than those of the mothers in the FPIAP group (Both p-values are <0.001, and the eta squared values were 0.184, and 0.197, respectively) (One-way ANOVA and Kruskal-Wallis tests were used to compare the groups) (Table 5).

Factors affecting quality of life parameters

Physical functioning: The model explains 20.2% of the variance in physical functioning and is significant (p < 0.001). High scores on the Beck Depression Inventory are significantly associated with the mother's physical functioning. There is a moderate correlation between a high Beck Depression Inventory score and physical functioning (r=0.45).

Table 3 Comparison of demographics of mothers in IgE-mediated, food protein-induced allergic proctocolitis and control groups.

	IgE-mediated n (%)	FPIAP n (%)	Control n (%)	P
Mother's age, median (min-max), years	29 (23-42)	29 (23-40)	31 (21-49)	0.085
Mother's education level				0.194
Primary education	12 (28.6)	6 (14.3)	12 (28.6)	
High school	13 (31.0)	9 (21.4)	8 (19.0)	
University	17 (40.5)	27 (64.3)	22 (52.4)	
Mother's employment status				0.765
Working	13 (30.9)	12 (28.6)	14 (33.3)	
Nonworking	29 (69.1)	30 (71.4)	28 (66.6)	
Total	42 (100.0)	42 (100.0)	42 (100.0)	

Chi square test was used, p<0.05 is considered significant. Statistically significant p values are in bold.

Table 4 Comparison of groups in terms of Beck's Depression Inventory, STAI-AS, and STAI-T scores

	Mothers in the IgE-mediated Group n=42	Mothers in the FPIAP Group n=42	Mothers in the Control Group n=42	P	Eta squared
BECK's Depression Inventory Mean±standard deviation	14.5±6.9 ^a	13.0±3.3 ^β	6.3±2.8 ^{aβ}	<0.001	0.364
STAI-S anxiety score Mean±standard deviation	44.8±8.58 ^a	42.5±8.0 ^β	27.3±3.23 ^{aβ}	<0.001	0.555
STAI-T anxiety score Mean±standard deviation	46.3±6.10 ^{aβ}	43.2±4.9 ^{aε}	31.3±3.20 ^{βε}	<0.001	0.641

ANOVA test was used ($p < 0.05$ was considered significant). Statistically significant p-values are in bold. There is a statistically significant difference between groups with similar symbols.

Table 5 Comparison of groups in terms of short form-36 scores.

	Mothers in the IgE-mediated Group n=42	Mothers in the FPIAP Group n=42	Mothers in the Control Group n=42	P	Eta squared
Physical functioning & Mean±standard deviation	85.8±15.0 ^{aβ}	96.3± 6.4 ^a	96.3± 7.9 ^β	<0.001	0.184
Role limitations because of physical health Mean±standard deviation	53.7±40.5 ^{aβ}	78.0± 27.7 ^a	89.8± 21.4 ^β	<0.001	0.185
Role limitations because of emotional health Mean±standard deviation	54.0±34.6 ^a	68.3±23.3 ^β	87.3±24.3 ^{aβ}	<0.001	0.197
Energy/fatigue [∞] Mean±standard deviation	44.1±14.9 ^a	45.4± 14.5 ^β	79.5± 8.11 ^{aβ}	<0.001	0.626
Emotional well-being [∞] Mean±standard deviation	59.4±14.0 ^a	63.9± 11.4 ^β	89.4± 5.18 ^{aβ}	<0.001	0.592
Social functioning [∞] Mean±standard deviation	72.9±16.0 ^a	75.8±12.9 ^β	91.3±10.5 ^{aβ}	<0.001	0.274
Pain [∞] Mean±standard deviation	73.2±21.5	67.6±25.1 ^a	79.9±14.0 ^a	0.028	0.056
General Health [∞] Mean±standard deviation	61.7±14.5 ^a	63.0± 17.6 ^β	85.0± 12.4 ^{aβ}	<0.001	0.342
Health change [∞] Mean±standard deviation	56.1±24.2	55.5± 17.0	65.6± 20.5	0.053	0.047

[∞]ANOVA and & Kruskal-Wallis test were used ($p < 0.05$ was considered significant). Statistically significant p-values are in bold. There is a statistically significant difference between groups with similar symbols.

Role limitations because of physical health: The model explains 35.4% of the variance in role limitations because of physical health and is significant ($p < 0.001$). A high score on the Beck Depression Inventory is associated with negative maternal role limitations because of physical health. There is a moderate correlation between a high Beck Depression Inventory score and role limitations because of physical health ($r=0.58$).

Role limitations because of emotional health: The model explains 31.4% of the variance in role limitations because of emotional health and is significant ($p < 0.001$). A high score on the Beck Depression Inventory and maternal age are associated with negative maternal role limitations because of emotional health. The variable with the largest

effect size was high Beck Depression Inventory score (std. $\beta = -0.367$). There was a moderate correlation between high Beck Depression Inventory score and role limitations because of emotional health ($r=0.43$).

Energy/fatigue: The model explained 67.4% of the variance in energy/fatigue and was significant ($p < 0.001$). High levels of state anxiety (STAI), high levels of trait anxiety (TRAIT), and a child's food allergy were found to be associated with low energy levels in mothers. The variable with the largest effect size was high TRAIT anxiety score (std. $\beta = -0.352$). There was a strong correlation between high TRAIT anxiety score and low energy/fatigue in the mothers ($r=0.80$).

Emotional well-being: The model explained 77.7% of the variance in emotional well-being and was significant ($p < 0.001$).

Table 6 Linear regression analysis for factors affecting SF-36 subparameters.

Model coefficients - SF-36: Physical functioning				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.477	0.227	0.202	8.9	4	121	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Alt sınır	Üst sınır
Constant term	99.91	10.1	9.8	<0.001			
BECK Depression Score	-0.650	0.246	-2.64	<0.009	-0.330	-1.136	-0.163
Model coefficients - SF-36: Role limitations because of physical health				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.625	0.390	0.354	10.8	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	57.1	35.5	1.6	0.11			
Beck depression score	-2.66	0.66	-4.03	0.001	-0.459	-3.96	-1.35
Model coefficients - SF-36: Role limitations because of emotional health				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.593	0.352	0.314	9.1	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	54.6	33.2	1.6	0.103			
Beck depression Score	-1.92	0.616	-3.13	0.002	-0.367	-3.152	-0.711
Mother's age	1.02	0.451	2.26	0.025	0.176	-0.129	1.914
Model coefficients - SF-36: Energy/fatigue				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.832	0.692	0.674	37.9	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	107.5	15.3	6.98	<.001			
STAI-S anxiety score	-0.478	0.212	-2.25	0.026	-0.240	-0.899	-0.057
STAI-T anxiety score	-0.904	0.293	-3.08	0.003	-0.352	-1.484	-0.324
Absence of food allergy in the child	4.769	2.02	2.36	0.020	0.188	0.767	8.771

(continues)

Table 6 Continued.

Model coefficients - SF-36: Emotional well-being				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.888	0.789	0.777	63.0	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	119.4	10.5	11.4	<0.001			
Beck depression score	-0.619	0.195	-3.178	0.002	-0.213	-1.004	-0.233
STAI-S anxiety score	-0.365	0.145	-2.522	0.013	-0.223	-0.651	-0.078
STAI-T anxiety score	-0.800	0.200	-4.010	0.001	-0.379	-1.195	-0.405
Absence of food allergy in the child	2.912	1.376	2.116	0.036	0.140	0.187	5.637
Model coefficients - SF-36: Social functioning				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.636	0.404	0.369	11.43	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	106.43	16.0	6.64	<0.001			
Beck depression score	-0.648	0.297	-2.178	0.031	-0.245	-1.236	-0.059
STAI-T anxiety score	-0.618	0.305	-2.029	0.045	-0.323	-1.222	-0.015
Model coefficients - SF-36: General health				General significance test of the model			
Model	R	R ²	Corrected R ²	F	df1	df2	p
1	0.660	0.435	0.402	13.0	7	118	<0.001
Independent variable	Beta coefficient	Standard deviation	t	p	Stand. Beta coefficient	95.0% Confidence interval	
						Lower limit	Upper limit
Constant term	106.22	18.3	5.78	<0.001			
Beck depression score	-0.773	0.341	-2.267	0.025	-0.118	-1.447	0.294

The presence of food allergies in children, high Beck Depression Scale scores, high State Anxiety Test (STAI) scores, and high Trait Anxiety Test (TRAIT) scores are negatively associated with mothers' emotional well-being. The variable with the largest effect size is the high TRAIT anxiety score (stand. $\beta = -0.379$). There is a strong correlation between a high TRAIT anxiety score and low emotional well-being in the mothers ($r=0.85$).

Social functioning: The model explains 36.9% of social functioning and is significant ($p < 0.001$). High Beck Depression Inventory scores and high Personality Anxiety Level (TRAIT) scores are negatively associated with mothers' social functioning. The variable with the largest effect size is the high Beck Depression Inventory score (stand. $\beta = -0.323$). There is a moderate correlation between a high

Beck Depression Inventory score and low social functioning in the mothers ($r=0.55$).

General health: The model explains 40.2% of general health perception and is significant ($p < 0.001$). High Beck Depression Inventory scores are negatively associated with general health. There is a moderate correlation between a high Beck Depression Inventory score and general health in the mothers ($r=0.58$) (Table 6).

Discussion

Mothers of children with food allergies not only have to manage their children's allergies but also cope with the psychosocial burden associated with this condition. Studies

show that difficulties such as anxiety, burnout, and social withdrawal are common in these mothers. The constant need to be vigilant, avoid social activities, and anxiety about life-threatening reactions are associated with a lower quality of life for mothers.^{9,10,11}

The literature has reported increased levels of depression in parents (especially mothers) of children with food allergies compared to the general population.¹² A recent review found higher rates of depression and anxiety in caregivers of children with IgE-mediated food allergies, and demonstrated significantly impaired quality of life. The same review also showed that caregivers of children with FPIES had more severe quality of life impairments than caregivers of children with IgE-mediated food allergies.¹³ A recent study reported a higher rate of depression in parents of children with both IgE mediated and non-IgE-mediated food allergies compared to a control group.¹² (Zhang et al.). Another study reported a higher stress load in mothers of children with allergic proctocolitis.¹⁴ (Our study included only patients with allergic proctocolitis; mothers of children with other non-IgE-mediated food allergies (e.g., FPIES, EoE) were excluded. Therefore, our study reflects the depression and anxiety levels of mothers of patients with allergic proctocolitis, rather than mothers of all patients with non-IgE-mediated food allergies. In addition, in our study, mothers in both the IgE-mediated food allergy groups had higher depression scores than mothers in the control group.

Past studies have used numerous different questionnaires and scales to assess anxiety and stress in parents of children with food allergies. Studies using these scales have yielded mixed results when comparing parents' depression and anxiety scores with healthy controls. In addition, numerous scales have been developed to measure parental stress related to food allergy. However, their clinical use is limited. Furthermore, numerous factors influence parental stress, including male gender, use of autoinjectors, severity of reaction, concomitant atopic disease, type of allergen, use of oral challenge tests, level of education, income, and having multiple children.³ Because of the small number of patients with IgE-mediated food allergies in our study (e.g., a history of anaphylaxis was observed in only 22 patients) and the retrospective nature of patient data, statistical analyses related to these parameters were not performed. In addition, the STAI and TRAIT anxiety scores were used in our study. Some studies have found elevated STAI (state) anxiety levels in mothers of children with food allergies, particularly in caregivers of children who have experienced anaphylaxis in the past.^{15,16,17} In our study, when comparing the food allergy groups and the control group, STAI anxiety scores were found to be higher in both the IgE-mediated food allergy and FPIAP mothers than in the control group.

The literature reports that TRAIT (trait) anxiety levels are elevated in mothers of children with food allergies.^{15,18} In one review, mothers who are excessively concerned about food allergies often stated that their children were mentally paralyzed by fear of death because of food exposure. Children of these mothers also had higher general and trait anxiety levels. It has been emphasized that cognitive behavioral therapy may be effective in reducing anxiety and depression in mothers.¹⁸ In our study, mothers in the IgE-mediated group had higher TRAIT anxiety scores than

both mothers in the FPIAP group and mothers in the control group. In addition, mothers in the FPIAP group had higher trait anxiety scores than mothers in the control group. This suggests that long-term anxiety levels may be higher in mothers of children with both IgE-mediated food allergy and FPIAP.

Several disease-specific scales have been used in the literature to measure the quality of life of parents of children with food allergies.¹⁰ In our study, the SF-36 was used to measure the mothers' quality of life. It has been reported in the literature that mothers of children with food allergies have decreased physical functioning, may occasionally experience limitations in fulfilling their daily roles, and may have lower role limitations because of physical health scores than mothers of children without allergies.^{10,19} A study by Ostblom et al. reported that parents of children with food hypersensitivity had lower scores compared to normative data in areas such as physical functioning, social functioning, role limitations because of emotional health, role limitations because of physical health, pain, and general health.²⁰ In our study, mothers in the IgE-mediated group had lower physical role difficulties scores than the control group. In our study, while the physical functioning scores and role limitations because of physical health scores of the mothers in the IgE-mediated group were lower than those of the mothers in the FPIAP group, there was no significant difference between the physical functioning scores of the mothers in both food allergy groups and the mothers in the control group.

The literature reports that parents of children with food allergies, especially mothers, experience role limitations because of their emotional states. Morou et al. reported that many parents avoid eating out, attending social events, or involving their children in shared childhood activities because of food allergies, and that this can lead to emotional role limitations and social isolation. The same study highlighted that this situation places a significant psychosocial burden on families and is associated with poor quality of life.¹⁰ Another study reported significantly lower quality of life in the emotional functioning domain in parents of children with non-IgE-mediated food allergies.²¹ Kim et al. reported significantly lower quality of life in caregivers of children with food allergies, particularly in terms of social functioning, emotional burden, and parenting stress. These effects increase with age and are more pronounced in cases diagnosed in the early years.²² In our study, role limitations because of emotional health scores of mothers in both the IgE-mediated food allergy and FPIAP groups were found to be lower than those in the control group.

Mothers of children with food allergies face a significant psychosocial burden in terms of emotional well-being because of the impact of the disease on daily life. Morou et al. reported that parents scored worse in the domains of "emotional health," "general quality of life," "impact on parenting time," and "restrictions on usual family activities."¹⁰ Meyer et al. emphasized that emotional functioning in families with non-IgE-mediated food allergies was affected and significantly worse than in families of children with intestinal insufficiency.²¹ In our study, the emotional well-being scores of mothers of children in both food allergy groups were significantly lower than those of mothers in

the control group, demonstrating the food allergy associated with the psychological well-being of mothers, consistent with the literature.

Mothers of children with food allergies may also experience significant limitations in their social lives. The literature has reported that food allergies can affect the social lives of mothers, leading to decreased social functioning. Mothers of children with allergies may have difficulty participating in social activities and have lower social quality of life scores.^{10,23} Valentine and Knibb found that parents of children with food allergies had poorer social relationships.²⁴ Cortes et al. have suggested that children's gastric symptoms may affect mothers' perceptions of social interaction with friends and family. They also reported that high symptom levels were associated with negative social interactions.²⁵ In a large-sample study testing the validity of the FAQLQ-PF across cultures, Dunn Galvin et al. presented a structured approach to assessing the psychosocial burden experienced by parents of children with food allergies. The study demonstrated that emotional stress and social limitations are particularly pronounced in families of younger children, and that family quality of life varies depending on the child's age, allergen diversity, and past reaction history. It was emphasized that social and dietary restrictions demonstrated the greatest reduction in psychological burden for groups with food allergies.²⁶ In our study, both groups of mothers of children with food allergies had lower social functioning scores compared to the control group; this suggests that food allergies may be associated with negative social lives of mothers, consistent with data from the literature.

It has been suggested in the literature that mothers of children with food allergies may have lower general health perceptions than mothers of healthy children because of living with a constant allergen challenge; indeed, some studies have shown that mothers of these children have significantly lower general health subscale scores.¹⁰ Meyer et al., in their study of families with non-IgE-mediated food allergies, found that the total family impact module (FIM) score was worse in families with intestinal failure and sickle cell disease.²¹ In our study, the general health perceptions of mothers in both food allergy groups were lower than in mothers in the control group, which is similar to the literature.

One of the limitations of our study is the limited sample size. Because the number of participants in our study was small, definitive conclusions cannot be drawn from the results. Secondly, only mothers were included in the study, excluding fathers and caregivers. In spite of this, our study had several strengths. First, we evaluated the association between depression, anxiety, and quality of life in mothers of both IgE-mediated food allergy and FPIAP. Second, the SF-36 questionnaire was used as a quality of life questionnaire in our study. The SF-36 questionnaire allowed us to measure the relationship between food allergies and the overall quality of life of mothers of children with food allergies.

Consequently, mothers of children with both IgE-mediated food allergy and FPIAP may experience depression and anxiety disorders, as well as a decrease in quality of life. These mothers should be evaluated from a psychosocial perspective.

Disclosure

The manuscript has not been published previously in print/electronic format or in another language, and it is not under consideration by another publication or electronic media.

Mandatory Disclosure on Use of Artificial Intelligence

The authors declare that no AI-assisted tools were used in the preparation of this manuscript. All references have been manually verified for accuracy and relevance.

Author Contributions

MHC did conceptualization; İKY, AS, SKS, CK, IT, and SKO did data curation; MHC and TS were in charge of formal analysis. MHC, İKY, TS, AS, SKS, CK, IT, and SKO performed investigation; MHC was in charge of methodology, supervision, and project administration; İKY, AS, SKS, CK, IT, and SKO was in charge of resources; MHC and TS were in charge of validation and visualization; and MHC and İKY did writing—original draft preparation and writing—review & editing. No one was in charge of funding acquisition and software.

Conflicts of Interest

None.

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References

1. Sicherer SH, Sampson HA. Food allergy: epidemiology, pathogenesis, diagnosis, and treatment. *J. Allergy Clin. Immunol.* 2014;133(2):291-307. <https://doi.org/10.1016/j.jaci.2013.11.020>.
2. Daley SF, Lopez CM, Mendez MD. Food Allergies. [Updated 2025 May 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482187/>
3. Westwell-Roper C, To S, Andjelic G, Lu C, Lin B, Soller L, et al. Food-allergy-specific anxiety and distress in parents of children with food allergy: a systematic review. *Pediatr. Allergy Immunol.* 2022;33(1):e13695. <https://doi.org/10.1111/pai.13695>
4. Goodwin RD, Rodgin S, Goldman R, Rodriguez J, deVos G, Serebrisky D, et al. Food allergy and anxiety and depression among ethnic minority children and their caregivers. *J. Pediatr.* 2017;187:258-64.e1. <https://doi.org/10.1016/j.jpeds.2017.04.055>
5. Beck depresyon envanteri. Available from; <https://androloji.org.tr/androlojiDATA/Document/25112014164858-10-BECK-DEPRESYON-ENVANTERI.pdf>. Accessed 10 January 2024.
6. Öner, N. ve Le Compte, A. (1998). *Süreksiz Durumluk/ Sürekli Kaygı Evanteri El Kitabı*. (2. Basım). İstanbul: Boğaziçi Üniversitesi Yayınevi.

7. Hisli N, Beck Depresyon Envanteri'nin geçerliliği üzerine bir çalışma. *Psikoloji Dergisi* 1988; 6:118-122. Available from; Beck Depresyon Envanteri|TOAD. Accessed 10 January 2024.
8. Koçyiğit H, Aydemir Ö, Fişek G, Ölmez N, Memiş AK. Form-36 (KF-36)'nın Türkçe versiyonunun güvenilirliği ve geçerliliği. *İlaç ve tedavi dergisi*. 1999;12(2):102-6.
9. Feng C, Kim JH. Beyond avoidance: the psychosocial impact of food allergies. *Clin. Rev. Allergy Immunol*. 2019;57(1):74-82. <https://doi.org/10.1007/s12016-018-8708-x>
10. Morou Z, Tatsioni A, Dimoliatis ID, Papadopoulos NG. Health-related quality of life in children with food allergy and their parents: a systematic review of the literature. *J. Investig. Allergol. Clin. Immunol*. 2014;24(6):382-95.
11. Williams NA, Hankey M. Support and negativity in interpersonal relationships impact caregivers' quality of life in pediatric food allergy. *Qual. Life. Res*. 2015;24(6):1369-78. <https://doi.org/10.1007/s11136-014-0862-x>
12. Zhang J, Xie M, Liao X, Zhang Y, Chen H. Effect of symptom levels of children's food allergy on maternal depression: A cross-sectional and cohort study. *Actas Esp Psiquiatr*. 2024;52(3):248-55. <https://doi.org/10.62641/aep.v52i3.1642>
13. Bingemann TA, LeBovidge J, Bartnikas L, Protudjer JLP, Herbert LJ. Psychosocial impact of food allergy on children and adults and practical interventions. *Curr. Allergy Asthma Rep*. 2024;24(3):107-19. <https://doi.org/10.1007/s11882-023-01121-x>
14. Celik P, Yilmaz D, Yuksel F, et al. Behavioral feeding problems and parenting stress in toddlers with food protein-induced allergic proctocolitis. *Ann Allergy Asthma Immunol*. 2025;134(2):223-230. <https://doi.org/10.1016/j.anai.2024.11.003>
15. Strinnholm A, Brulin C, Lindh V. Experiences of double-blind, placebo-controlled food challenges (DBPCFC): a qualitative analysis of mothers' experiences. *J. Child Health Care*. 2010;14(2):179-188. <https://doi.org/10.1177/1367493509359227>
16. Annunziato RA, Shemesh E, Weiss CC, Izzo GN, D'Urso C, Sicherer SH. An assessment of the mental health care needs and utilization by families of children with a food allergy. *J. Health Psychol*. 2013;18(11):1456-1464. <https://doi.org/10.1177/1359105312464675>
17. Muraro A, Werfel T, Hoffmann-Sommergruber K, Roberts G, Beyer K, Bindslev-Jensen C, et al. EAACI food allergy and anaphylaxis guidelines: diagnosis and management of food allergy. *Allergy*. 2014;69(8):1008-25. <https://doi.org/10.1111/all.12429>
18. Chong KW, Turner PJ. Food allergy desensitisation: a hard nut to crack? *Arch. Dis. Child*. 2019;104(11):1021-1022. <https://doi.org/10.1136/archdischild-2019-317690>
19. Cummings AJ, Knibb RC, King RM, Lucas JS. The psychosocial impact of food allergy and food hypersensitivity in children, adolescents and their families: a review. *Allergy*. 2010;65(8):933-45. <https://doi.org/10.1111/j.1398-9995.2010.02342.x>
20. Ostblom E, Egmar AC, Gardulf A, Lilja G, Wickman M. The impact of food hypersensitivity reported in 9-year-old children by their parents on health-related quality of life. *Allergy*. 2008;63(2):211-8. <https://doi.org/10.1111/j.1398-9995.2007.01559.x>
21. Meyer R, Godwin H, Dziubak R, Panepinto JA, Foong RM, Bryon M, et al. The impact on quality of life on families of children on an elimination diet for non-immunoglobulin E mediated gastrointestinal food allergies. *World Allergy Organ. J*. 2017;10(1): 8. <https://doi.org/10.1186/s40413-016-0139-7>
22. Kim S, Kim M, Kim J, Park B, Min N, Jung M, et al. Quality of life in food allergy: validation of the Korean version of the food allergy quality of life questionnaire parent form (K-FAQLQ-PF) and risk factor analysis. *Allergy Asthma Immunol. Res*. 2023;15(1):43-54. <https://doi.org/10.4168/aair.2023.15.1.43>
23. Proctor KB, Tison K, H HE, Park J, Scahill L, Vickery BP, et al. A systematic review of parent report measures assessing the psychosocial impact of food allergy on patients and families. *Allergy*. 2022;77(5):1347-59. <https://doi.org/10.1111/all.15140>
24. Valentine AZ, Knibb RC. Exploring quality of life in families of children living with and without a severe food allergy. *Appetite*. 2011;57(2):467-74. <https://doi.org/10.1016/j.appet.2011.06.007>
25. Cortes A, Castillo A, Sciaraffia A. Food allergy: children's symptom levels are associated with mothers' psycho-socio-economic variables. *J. Psychosom. Res*. 2018;104:48-54. <https://doi.org/10.1016/j.jpsychores.2017.11.009>
26. DunnGalvin A, Dubois AE, Flokstra-de Blok BM, Hourihane JO. The effects of food allergy on quality of life. *Chem. Immunol. Allergy*. 2015;101:235-52. <https://doi.org/10.1159/000375106>