



## Depression and anxiety in child and adolescents with follow-up celiac disease and in their families

### SMALL BOWEL

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### ABSTRACT

**Background/Aims:** Earlier research has indicated a positive association between Celiac disease and some mental disorders in both adults and children. The aim of this study was to explore the diet compliance and depression and anxiety levels of pediatric celiac children and their families after a gluten-free diet.

**Materials and Methods:** A total of 30 celiac pediatric patients (17 children [57%] and 13 adolescents [43%]) were enrolled in the study, and 20 healthy controls (11 children [55%] and 9 adolescents [45%]) were studied as controls. Depression was assessed with the Children's Depression Inventory (CDI) form, and anxiety was assessed with the Screen for Child Anxiety Related Disorders (SCARED) form. Diet compliance was measured with a diet compliance form, and the families were asked to complete the Beck Depression Measurement (BDI) form for depression and the State-Trait Anxiety Inventory I-II (STAI-I and STAI-II) forms for anxiety.

**Results:** There was no significant difference in depression and anxiety between pediatric celiac patients consuming a gluten-free diet and the healthy control group. We observed no difference in depression and anxiety in the Celiac CD group patients. Diet compliance was 73.3% in the study group.

**Conclusion:** The depression and anxiety levels of pediatric celiac patients and their parents did not differ from those in the healthy group.

**Keywords:** Pediatric Celiac patients, parents, depression, anxiety

### INTRODUCTION

Celiac disease (CD) is an autoimmune disease characterized by nutrient malabsorption in the small intestine triggered by exposure to gluten (1,2). The disease incidence varies from 1/80 to 1/300 (3). The clinical indications of CD are malabsorption, weight loss, chronic diarrhea, and steatorrhea. However, other atypical indications may be encountered, such as hepatic hyperfunction, hair loss, osteoporosis, growth retardation, and epilepsy. At present, the only treatment is lifelong adherence to a gluten-free diet. As indicated in the literature, mental disorders, such as depression and anxiety, have been reported in patients with Celiac disease CD (1,2).

The pathogenetic mechanisms of mental and behavioral disorders associated with CD are not fully under-

stood. Tryptophan deficiency and central serotonergic hypofunction have been suggested as possible causes. Depression and anxiety are the most frequently observed psychiatric problems in CD (4). While depression is generally observed in adult CD patients, emotional disorders are more frequently observed in children and adolescent CD patients. Psychiatric problems have been reported in 21% of CD patients who have not started dietary treatment with a gluten-free diet (4). In a study of adolescents by Pynnonen et al. (5), symptoms of depressive disorders had been observed prior to an established diagnosis of CD, and the patients were reported to be completely asymptomatic after undergoing treatment with a gluten-free diet.

In studies of gluten-free diet compliance, a restrictive diet is reported to be particularly difficult for children

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and adolescents. Studies have reported diet compliance rates of 52%-81% (6-8). Adolescent girls with high levels of self-esteem and successful academic achievements have 100% compliance with gluten-free diets (6).

The parents of children with various health problems are known to be at risk for disorders with internalized symptoms, such as depression and anxiety (8). The parents of chronically ill children often show signs of post-traumatic stress (9).

This study first aimed to evaluate the depression and anxiety levels in children and adolescents who were followed-up with a diagnosis of CD in comparison with a healthy control group. We also investigated compliance to a recommended diet and compared the depression and anxiety levels of the parents of CD patients and those of healthy controls. This issue has not been previously investigated in Turkey.

## MATERIALS AND METHODS

### Subjects

Between June 2010 and September 2010, children and adolescents with CD who were attending the clinics of the Pediatric Gastroenterology, Hepatology, and Nutrition Department of Bursa Dörtçelik Children's Hospital were enrolled in the study. The Celiac patients were diagnosed according to "the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition" (ESPGHAN) criteria. The patients without any concomitant severe chronic disease had been consuming a gluten-free diet for at least 1 year.

Study participants (8-18 years of age) were allocated in pediatric (8-12 years) and adolescent (13-18 years) groups. Participants in both groups and their parents could read and complete our forms.

The study population included 50 children and adolescents. The study groups consisted of 30 CD patients (21 females and 9 males; mean age, 11.9±2 years) and 20 asymptomatic volunteers recruited from the relatives of the medical staff as a control group (13 females and 7 males; mean age, 12±2 years). We also examined the medical statuses of the parents of the study participants. Informed consent was obtained from the study participants and their parents, and the study was conducted according to the tenets of the Declaration of Helsinki. Study approval was obtained prior to the study from the Medical Research Ethics Committee of Uludağ University Medical Faculty.

A sociodemographic data form, the Children's Depression Inventory (CDI), the Childhood Anxiety Disorders Screening Measure (SCARED), and the survey for Dietary Compliance of Celiac Patients were administered to the children and adolescents in both groups. The participating parents completed the State-Trait Anxiety Inventory I-II (STAI-I, STAI-II) and the Beck Depression Measurement (BDI) forms.

### Forms and measurements

**Personal information form.** This form consists of 30 items collecting data concerning past and current personal and family history, including alcohol and tobacco consumption and psychiatric disorders.

**Celiac patient diet compliance form.** This form contains items questioning dietary compliance, hospitalization, and problems in accessing gluten-free food by the dietician who was controlling these celiac patients regularly. This form contains questions such as "Do you stick to your diet?" and "Were you ever hospitalized because of not complying with your diet?". The patients and their parents answered these questions in the form of "yes" or "no".

**CDI:** The CDI contains 27 items aimed at defining the level of depression in children; a score of 19 points or more is indicative of depression (10,11).

The SCARED test contains 41 Likert-type questions, with a total score ranging from 0 to 82 points. Higher total scores indicate a higher level of anxiety (12,13).

**STAI-I, STAI-II:** This scale, designed by Spielberger et al. (14), was used to measure temporary and permanent state of anxiety. The State Anxiety Inventory (STAI-I) defines an individual's feelings at a particular moment or under particular conditions, whereas the Trait Anxiety Inventory (STAI-II) defines how an individual feels, independent of the situation and conditions. There are direct and indirect (inverse) statements in the scale. The total points for the indirect (inverse) statements are subtracted from the total weighted points obtained from the direct statements, and a constant value of 50 points is added for STAI-I versus 35 points for STAI-II. Total points vary between 20 and 80, and scores of 45 or above are indicative of anxiety (14,15).

**BDI:** Each question is scored between 0 and 3 points, and total points vary from 0 to 63. A cutoff level of 17 points is accepted (16,17).

### Statistical analysis

SPSS for Windows 13.0 (Chicago, IL, USA) was used for the statistical analysis. The values for the variables in the study were given as the mean, median, standard deviation, and maximum-minimum. Independent Student's t-test was applied as a parametric test to compare two groups of continuous variables showing normal distribution. For variables not showing a normal distribution, the Mann-Whitney U-test was used to compare two groups. Pearson's chi-squared and Fisher's exact chi-squared tests were used to compare groups of categorical variables. Pearson's and Spearman's correlation coefficients were used to examine the relationships between continuous variables. A p value of <0.05 was considered to be significant throughout the study.

**Table 1.** Comparison of the Celiac and healthy controls by gender, child or adolescent status, and existence of psychiatric disease

		Celiac patients (n=30)	Healthy controls (n=20)	p
Gender	Male	9	7	0.951
	Female	21	13	
	Child	17	11	
	Adolescents	13	9	
History of psychiatric disease in the family	Yes	7	5	1
	No	23	15	

**Table 2.** Comparison of the Celiac and healthy groups by depression and anxiety in children, adolescents, and families

		Celiac patients (n=30)	Healthy controls (n=20)	p
Child and adolescents group	CDI points	8.73±5.51	8.3±4.02	0.921
	SCARED points	24.5±14.41	17.85±9.12	0.120
Parents group	BDI points	14.07±10	12.65±6.71	0.766
	STAI-I	41.73±6.88	39.3±8.88	0.131
	STAI-II	41.33±6	43.15±7.12	0.27

CDI: children's depression inventory; SCARED: childhood anxiety disorders screening measure; BDI: the beck depression inventory; STAI-I, STAI-II: the state-trait anxiety inventory I-II

**Table 3.** Comparison of the diet compliant and non-compliant groups and their parents, according to depression and anxiety levels

		Diet compliant (n=22)	Non-compliant (n=8)	p
Child and adolescents group	CDI points	7.68±5.19	11.63±5.65	0.107
	SCARED points	24.18±15.03	25.38±13.46	0.836
Parents group	BDI points	12.27±8.64	19±12.46	0.156
	STAI-I	40.05±5.62	46.38±8.24	0.04
	STAI-II	39.41±4.98	46.63±5.57	0.004

CDI: children's depression inventory; SCARED: childhood anxiety disorders screening measure; BDI: the beck depression inventory; STAI-I, STAI-II: the state-trait anxiety inventory I-II

## RESULTS

The Celiac group was composed of 30 patients (21 females and 9 males), and the control group was composed of 20 healthy children (13 females and 7 males). There were no significant between-group differences in terms of age ( $p=0.689$ ) or gender ( $p=0.951$ ). The study group consisted of 17 (56.7%) children and 13 (43.3%) adolescents, and the control group contained 11 (55%) children and 9 (45%) adolescents. Psychiatric disorders were identified in 7 families (23.3%) in the CD group and 5 families (25%) in the control group, and there was no statistically significant difference between the patient and control groups ( $p=1$ ). The results are shown in Table 1.

The mean CDI scores for the CD and control groups were estimated as  $8.73\pm 5.51$  and  $8.30\pm 4.02$  points ( $p=0.921$ ), respectively, while the SCARED scores were  $24.5\pm 14.51$  and  $17.85\pm 9.12$  ( $p=0.120$ ) points, respectively. Therefore, in our study, there was no difference in depression and anxiety scores between the CD and healthy groups. Only one patient from the Celiac group had a score greater than 19 points (Table 2).

The mean BDI scores for the CD and control groups were  $14.07\pm 10$  and  $12.65\pm 6.71$  ( $p=0.766$ ), respectively. There was no statistically significant difference in the depression scores between the Celiac and control groups. The anxiety levels of the parents of both groups were compared, and the mean STAI-I scores were found to be  $41.73\pm 6.88$  and  $39.3\pm 8.88$  points in the CD and control groups, respectively ( $p=0.131$ ). However, the corresponding STAI-II scores were  $41.33\pm 6$  and  $43.15\pm 7.12$  points, respectively ( $p=0.27$ ). In conclusion, the state and trait anxiety levels of the parents of CD patients were not statistically significantly different from those of the parents of the control group participants (Table 2).

The majority (73.3%) of the whole study population complied with their gluten-free diets, while 15 girls (71.4%) and 7 boys (77.6%) adhered to their recommended diets ( $p=1$ ). In the Celiac group, 10 (76.5%) of the 17 children and 9 (69.2%) of the 13 adolescents ( $p=0.698$ ) were compliant. According to the responses given by 26 of the observed celiac patients, no relationship was determined between the patient age at diagnosis and dietary compliance ( $p=0.108$ ).

The CDI scores of compliant and non-compliant groups were estimated as  $7.68\pm 5.19$  and  $11.63\pm 5.65$  points ( $p=0.107$ ), respectively, while the corresponding SCARED scores were  $24.18\pm 15.03$  and  $25.38\pm 13.46$  points ( $p=0.836$ ), respectively, without any statistically significant between-group difference in the depression and anxiety levels. The BDI scores of the parents of the diet-compliant patients and the control subjects were  $12.27\pm 8.64$ , and  $19\pm 12.46$  points, respectively ( $p=0.156$ ). No statistically significant difference was detected in the parents' depression scores in the compliant and non-compliant groups. The anxiety levels of the parents of both groups were compared, and the STAI-I scores were found to be  $40.05\pm 5.62$  points in the compliant group and  $46.38\pm 8.24$  points in the non-compliant group ( $p=0.04$ ). However, the respective STAI-II scores for the compliant and the noncompliant groups were  $39.41\pm 4.98$  and  $46.63\pm 5.57$  points ( $p=0.004$ ). According to our findings, the state and trait anxiety levels of the parents of the non-compliant group were higher than the corresponding scores of the compliant group (Table 3).

## DISCUSSION

The mechanisms of psychiatric disorders associated with CD are not fully understood. Tryptophan deficiency and central serotonergic hypofunction have been suggested as possible causes. The regulation of serum tryptophan levels has been reported to improve depressive symptoms (4,18,19).

After starting a gluten-free diet, anxiety levels decrease, but depression symptoms continue in CD patients (19,20). Studies have not shown any relationship between the depression complaints observed in CD patients and age, gender, and socio-economic variables (19). According to the literature, there is no relationship between physical symptoms, such as abdominal pain and diarrhea, and depression symptoms (3,21,22). The control group in this study was similar to the study group in terms of age and gender.

In a study by Fera et al. (21), CD patients with concomitant type 1 diabetes mellitus had higher depression and anxiety scores than the control group participants. However, the authors also indicated that this trend in test scores was due to the concomitant chronic illness (DM) rather than CD alone. Other studies have reported that there is no relationship between the depression symptoms observed in CD patients diagnosed in childhood or as adults and the disease duration and gluten-rich diet intake (4,21). In our study, as in the literature, there was no difference in the symptoms of anxiety and depression between the pediatric and adolescent CD and control groups. Because the CD group in our study had no concomitant chronic disease and mostly complied with their gluten-free diet, the depression and anxiety levels were low.

In the literature, the reported rates of dietary compliance among CD patients have ranged between 53% and 81% (6,21,22), which aligns with our estimate of 73.3%. The study results showed that gender and age (children or adolescents) had no effect on compliance with a gluten-free diet.

CD patients have been observed to gain weight when starting a gluten-free diet. Adolescent girls start to menstruate and complete their physical development at a rate comparable to their peers. Despite these favorable developments, adolescent CD patients can express dissatisfaction with their physique at this time and have difficulty in accepting the disease (23). Previous studies have shown that adolescent CD patients have the most difficulty in accepting a disease. Adolescents sometimes become upset because they predict problems adhering to a gluten-free diet in certain situations, such as eating out and being out with friends; the adolescents can experience jealousy towards their friends and anger towards the diet (23,24). Therefore, we investigated whether the depression and anxiety levels differed between the dietary compliant and non-compliant patients, but no differences were observed. Some studies have reported that a gluten-free diet has no effect on the development of anxiety and depression in CD children and adolescents (5,22). The results of the questionnaires for STAI-I, STAI-II, and BDI, which had been given to the mothers of the CD group participants (i.e., dietary compliant and non-compliant), showed that although there were no between-group differences in terms of the indicators of depression, anxiety was more evident in the gluten-free diet non-compliant group.

In our study, although the anxiety and depression scores of the Celiac patients were greater than those of the control group, the intergroup difference was not statistically significant. The anxiety and depression observed in CD patients and their parents can affect diet compliance. The limitation of our study is the limited number of patients and healthy controls enrolling in the study. In addition, it is recommended that subtle symptoms of depression, such as irritability, anger, and enuresis complaints, should also be investigated.

Based on results of this study, the following conclusions can be made:

- The incidences of depression and anxiety in the CD group did not differ from those in the normal population.
- The incidences of depression and anxiety among the parents of the CD patients did not differ from those in the healthy control group.
- The parents of the patients in the gluten-free diet non-compliant group have higher anxiety levels than the parents of the patients in the compliant group.

During the follow up of child and adolescent Celiac patients, pediatric gastroenterology specialists must obtain psychiatric support for psychiatric problems experienced by both patients and their families.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the Uludağ University Medical Faculty Ethics Committee.

**Informed Consent:** Written informed consent was obtained from patients and healthy controls and the parents who participated in this study.

**Peer-review:** Externally peer-reviewed.

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