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The Frequency of Eating Disorders, Associated Factors, and Quality of Life in Patients with Bipolar Disorder: An Investigation in the Context of Behavioral Inhibition/Activation Systems

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ABSTRACT

Objective: This study aimed to determine the frequency of eating disorder (ED) in patients with bipolar disorder (BD) and healthy controls; and whether there is a relationship between eating attitudes, quality of life and personality traits determined by Behavioral Inhibition System and Behavioral Activation System (BIS/BAS).

Method: The study was designed as a cross-sectional study in the psychiatry outpatient clinic. We included 76 BD patients and 74 controls who were similar in terms of gender, age, and education level. We utilized Behavioral Inhibition System/Behavioral Activation System Scale (BIS/BASS), Night Eating Questionnaire (NEQ), Eating Attitude Test (EAT), Eating Disorders Examination Questionnaire (EDE-Q), and Quality of Life Scale Short Form (SF-36).

Results: The frequency of ED was 18.4% in participants with BD and 1.3% in the control group. Compared with the control group; the physical function subscales scores, role difficulty physical subscales scores, social function and role difficulty emotional subscale scores of SF-36 were lower in BD patients; while the BAS, the EAT, the NEQ scales and eating concern, body concern and weight concern subscales and mean scores of the EDE-Q were found to be higher.

Conclusions: The frequency of ED is increased in BD patients. Our study is one of very few in the literature to examine the comorbidity of BD and ED, and the factor associated with the presence of ED. The data obtained will hopefullly contribute to better diagnosis and treatment.

Keywords: Bipolar disorder, behavioral activation systems, behavioral inhibition system, eating attitude test, eating disorder

INTRODUCTION

Bipolar disorder (BD) is a serious mental disorder known to cause high mortality, morbidity and loss of function in almost every field with periods of depression, mania, mixed or hypomania (Eroğlu and Özpoyraz 2010). A mental disorder comorbidity has been reported in 2/3 of the patients with BD (Parker 2010), and eating disorder (ED) is also noteworthy among these mental disorders (Yakovleva et al. 2023). It is known that the frequency of ED in people with BD varies between 1% and 33% and is more common than in the general population (McDonald et al. 2019). In addition, it has been understood that conditions such as personality traits and temperament, biological parameters and disease courses can affect this comorbidity (Jen et al. 2013). There are also researches showing that this interaction is bidirectional. While the lifetime prevalence of BD was between 0-19% in studies of outpatients with eating disorders or population-based, it was between 36-64% in hospitalized eating disorders (Tseng et al. 2016).

BD and eating disorders are similar in terms of onset and progression. Both disorders usually begin in adolescence or early adulthood, and they have a phasic-cyclical or chronic course (McElroya et al. 2005). The prolonged course of BD disorders, anorexia nevroza (AN) and bulimia nervosa (BN) often are characterized by their predominance with depressive symptoms (McElroya et al. 2005). Additionally, studies have

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shown that family history is important in eating disorders and BD (McElroya et al. 2005).

While hypophagia and weight loss are more common in hypomania, mania and melancholic depression; increased appetite and weight are seen in atypical depression (Craba et al. 2021). In the researches, this situation has linked to the central role of serotonin pathways as a common biochemical mechanism in mood and eating behaviors (Ramacciotti et al. 2005). Additionally, behaviors such as guilt thoughts, hypothymia, euphoria, mood fluctuations, and suicidal attempts are also common mood symptoms in ED (Yakovleva et al. 2023). When BD patients with eating disorders are compared BD patients without eating disorders; it has been shown that patients with eating disorder are often female, have an earlier onset age of BD, attempt considerably more suicide, have higher number of attacks, have more frequent mood lability and significantly higher rates of obesity (McElroya et al. 2016, McAulay et al. 2023).

In a review article by McDonald et al (2019), the rate of having any BD and ED at the same time was found to be between 1.9% and 33.3%. And again, the same review showed that the lifetime BN comorbidity in individuals with BD-I ranged from 1.8% to 13.7%, the lifetime and current prevalence of binge eating disorder (BED) or binge eating in BD patients ranged from 2.6% to 30.0%, and the lifetime comorbid BED in groups consisting of individuals in the bipolar spectrum ranged from 9.5% to 14.2%. As it can be understood from such studies, studies examining BD and ED were conducted with different methods and different sample groups, and a consensus could not be established (McDonald et al. 2019).

The physical health and quality of life of patients with BD are affected (McAulay et al. 2021). It is thought that the deterioration in mental and physical health will increase and the quality of life will be more negatively affected in the presence of ED comorbid to BD (McAulay et al. 2021).

There are few studies examining the temperament or emotional characteristics and cognitive processes of patients with BD and BD comorbidity in the literature (Yakovleva et al. 2023). Studies examining eating behaviors and the psychological processes of their consequences in the BD patient group are also insufficient (McAulay et al. 2023). In addition, it appears that little is known about the symptom groups of patients with BD, whether or not they have ED, such as overeating, inappropriate behaviors towards weight and weight control, and overvaluing body shape (McAulay et al. 2023).

According to the Reinforcement Sensitivity Theory proposed by Jeffrey A. Gray, personality dimensions such as anxiety and impulsivity are related to individual differences in the functioning of two basic motivational systems in the brain (Şişman 2012). These systems are the "Behavioral Activation System (BAS)" and the "Behavioral Inhibition System (BIS). BAS regulates approach behaviour to environmental stimuli, while BIS regulates avoidance behaviour (Chiara 1995). Many researchers in the literature have suggested a relationship between BIS/BAS activation and various types of psychopathologies such as anxiety disorders, depression, attention deficit and hyperactivity disorder, psychopathy, eating disorders, schizophrenia, substance abuse and personality disorders (Şişman 2012). It has also been shown that there is a connection between BIS/BAS activation and vulnerability to mood disorders (Quilty et al. 2014).

Considering the findings and uncertainties in the current literature mentioned above, this study was created based on the hypothesis that the frequency of ED will increase in people with BD and that pathological attitudes may occur in their eating behaviors, their quality of life will deteriorate and their BIS/BAS sensitivity will increase. The aim of the study is to examine the connection between BD and ED. Another aim of the study is to investigate the frequency of ED, the characteristics of eating behaviour, the relationship between the participants' personality traits determined by BIS/BAS and their eating attitudes and quality of life in a sample consisting of healthy individuals and individuals diagnosed with BD who applied to the Psychiatry-Psychosis Clinic of Karadeniz Technical University (KTU) Farabi Hospital.

The results of this study will contribute to the identification of subgroups with ED in individuals with BD and the determination of additional interventions for these groups.

METHOD

The research was conducted on BD patients who were previously diagnosed with BD by psychiatrists, were under regular follow-up, and were prescribed medication at the Psychiatry-Psychosis Clinic of KTU Farabi Hospital. Of these patients, 152 individuals who consecutively applied to the clinic as outpatients between June 2018 and June 2019, were diagnosed with BD according to DSM-IV using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I), and were followed up during the euthymic period were screened for the study. At the time this study was designed, the Turkish adaptation and reliability study of the Clinician version of the Structured Clinical Interview for DSM-5 had not yet been conducted, so DSM-IV SCID-I was used. At the ethics committee stage, a power analysis was performed for the study and it was determined that collecting 75 BD patients would be sufficient to reach 80% power. The euthymic moods of the patients were assessed by using the Hamilton Depression Scale (HAM-D) and the Young Mania Rating Scale (YMRS). As euthymia criteria; according to clinical interview and SCID, being in remission for at least 2 months and Hamilton Depression Rating Scale (HAM-D)

score <7 and Young Mania Rating Scale (YMRS) score <5 were accepted. After euthymia was achieved during any mood episode, 2 months were waited to rule out the recurrence of a new mood episode or the transition from one mood episode to another. Thirty-one of the 152 patients did not accept to participate in the study. Of the remaining 121 patients, 11 patients were not included in the study because they were over 60 years old, 2 patients were under 18 years old, and 7 patients were not literate enough. Of the remaining 101 patients, 3 patients had mental retardation, a patient had epilepsy, and 3 patients had a history of electroconvulsive therapy (ECT) within the last 6 months, so these patients were also excluded from the study. Of the 94 BD patients included in the study, 18 were excluded from the study because they filled out some of the self-report scales incorrectly and/or incompletely. The remaining 76 euthymic patients with BD were included in the study as the participant group.

The criteria for including participants in the study involve having a diagnosis of Bipolar Disorder identified through a structured clinical interview (SCID-I) for DSM-IV Axis I disorders, being in remission for at least two months (remission criteria based on clinical interview and SCID indicate being in remission for at least 2 months with a Hamilton Depression Rating Scale (HAM-D) score of <7 and a Young Mania Rating Scale (YMRS) score of <5), being between the ages of 18 and 60, voluntary participation, and possessing verbal communication skills. On the other hand, criteria for exclusion from the study include illiteracy, mental retardation, having a diagnosis of another psychiatric disorder other than bipolar disorder in the last 2 months, exceeding age limits, organic mental disorders, major neurological disorders, and a history of alcohol/substance abuse. These established criteria aim to enhance the validity and reliability of the research.

The control group consisted of 74 individuals from among the staff of the KTU Farabi Hospital and patients and relatives who applied to other outpatients of the hospital, who were matched with the bipolar disorder patient group in terms of age, gender and education level, who did not have any psychiatric illness diagnosed at the time of the study and who agreed to participate in the study.

All participants included in the study were informed about the purpose and process of the research, their written informed consent was obtained, and their sociodemographic characteristics were recorded. Clinical interviews to evaluate eating disorders, SCID-I, HAM-D and YMRS applications were conducted by the physician conducting the research. Self-report scales (Behavioral Inhibition System/ Behavioral Activation System Scale (BIS/BASS), Night Eating Questionnaire (NEQ), Eating Attitude Test (EAT), Eating Disorders Examination Questionnaire (EDE-Q), and Quality of Life Scale Short Form (SF-36), were filled out by the participants.

All participants, respectively, were given the Hamilton Depression Scale (HAM-D) and Young Mania Rating Scale (YMRS) to assess symptom severity, the Behavioral Inhibition System / Behavioral Activation System Scale (BIS/BASS) to assess personality traits, the Night Eating Questionnaire (NEQ) to assess night eating behaviour, Eating Attitude Test (EAT) and Eating Disorders Evaluation Questionnaire (EDE-Q) to evaluate eating attitudes and the Quality of Life Scale Short Form to evaluate quality of life. The clinical interview, SCID-I, HAM-D, YMRS, BIS/BASS, NEQ, EAT, EDE-Q and Short Form of Quality of Life Scale (SF-6) were made by the doctor who conducted the research. Patients with a psychiatric diagnosis other than BD according to DSM-IV by applying SCID-I, previously diagnosed with dementia, a history of physical disease affecting the central nervous system, a history of head trauma causing loss of consciousness, mental retardation, and patients without informed consent have been excluded from work.

All applications performed in this study were carried out in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was initiated with the approval of the Scientific Research Ethics Committee of the KTU Faculty of Medicine, numbered 24237859-834 and dated 2019, and official permission from the hospital administration.

Sociodemographic Data Form: It was prepared by the authors of the study and designed to evaluate the sociodemographic information (such as age, gender, education level) and clinical characteristics of the study participants. All participants were administered the HAM-D and YMRS to assess symptom severity, BIS/BASS to assess personality traits, NEQ to assess night eating behaviour, EAT and EDE-Q to assess eating attitudes, and the Short Form of the Quality of Life Scale to assess quality of life, respectively.

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I): SCID-I was developed in 1987 to diagnose DSM-III-R axis I disorders with a structured clinical assessment tool (First et al. 1997). It was later updated for DSM-IV.

Hamilton Depression Scale (HAM-D): HAM-D is administered by the clinician and consists of 17 items. It measures the level and severity of depression in the patient. The scale was developed by Hamilton (1960) and Williams (1988). It was adapted into Turkish by Akdemir et al. (1996).

Young Mania Rating Scale (YMRS): It was developed to assess the severity and variation of mania symptoms by Young et al. (1997). It is filled in by the interviewer. A Turkish validity and reliability study was performed by Karadağ et al.

(2001). The items on the scale cover the core symptoms of the manic episode in BD.

Behavioral Inhibition System / Behavioral Activation System Scale (BIS/BAS): Biopsychological personality theory, which is known today as "Reinforcement Sensitivity Theory"; it was first introduced by Gray in 1970 and redefined in 1987 and 1990. Based on this theory, the Behavioral Inhibition System (BIS)/Behavioral Activation System (BAS) Scale was developed by Charles Carver and Teri White in 1994 (Şişman 2012). Scale, consists of two subscales: the avoidance system and the Behavioral Inhibition System (BIS) for anxiety behaviour, and the approach system and the Behavioral Activation System (BAS) for impulsive behaviour. On the BAS subscale; there are 3 subscales: fun seeking, reward responsiveness, and drive. In the 24-item scale, there are 7 items for the BIS subscale, 4 items for the fun seeking, 5 items for the reward responsiveness subscale, and 4 items for the drive subscale. The remaining 4 items are filler items. It is a 4-point Likert-type response system for each item (1=Totally Agree, 2=Agree Slightly, 3=Disagree a little, 4=Disagree at all). In scoring, all items except the 2nd and 22nd items are calculated by reversing. The validity and reliability study of the scale in Turkey was conducted by Simge Şişman in 2012. Cronbach's alpha coefficients of the scale were reported as "0.74 for BIS-anxiety; 0.63 for BAS-reward sensitivity; 0.65 for BAS-fun seeking; 0.73 for BAS-impulse" (Bilge 2020).

Night Eating Questionnaire (NEQ): NEQ is a self-report screening questionnaire consisting of 14 questions prepared by Allison et al. (2008), to evaluate both behavioral and psychological aspects of the syndrome developed for the diagnosis of Night Eating Syndrome. The Turkish validity and reliability of the questionnaire was demonstrated by Atasoy et al. (2014). Cronbach alpha coefficient was found to be 0.69 (Atasoy et al. 2014). The first nine questions in the questionnaire are filled by all participants. Participants who do not wake up at night or do not have a snack are warned not to continue in the next questions. Questions 10-12 are filled by the participants who have night awakenings, and questions 13 and 14 are filled by the participants who have nocturnal snacks. Items other than the 7th item in the questionnaire are scored between 0-4 using a five-point Likert type measurement. In the seventh item, intraday mood changes are questioned and those who do not change during the day get 0 points. Questions 1, 4 and 14 are reverse scored in the questionnaire. The cut-off score is recommended as 25 for screening research.

Eating Attitude Test (EAT): EAT; It is a self-report scale developed by Garner et al. (1982) that assesses possible disturbances in eating behaviour in both patients with eating disorders and individuals without eating disorders. The validity and reliability of the EAT in Turkey has been studied (Savaşır and Erol 1989). A Likert-type six-step response form is filled in and includes forty items. It is thought that the total score is directly related to the level of psychopathology and that EAT can detect both individuals who may be "disorder" at the clinical level and individuals who are predisposed to this disorder. The cut-off score for EAT is considered to be 30 points.

Eating Disorders Examination Questionnaire (EDE-Q): EDE-Q is the 28-item questionnaire version filled by the patient of the Eating Disorder Evaluation Interview (Fairburn 2008), which is a semi-structured interview accepted as the 'gold standard' in the evaluation of eating disorders. The first 22 questions belong to 4 subgroups that make up the core features of eating disorders. The Turkish translation of the scale was studied in adolescents and was found to be valid and sensitive (Yücel et al. 2011). The Turkish validity and reliability study for adults was conducted in 2019 by Istanbul University Social Sciences Institute, Department of Psychology as a thesis study of Baktıroğlu and it was shown that this scale is applicable, valid and reliable for the Turkish community. In addition, in the same thesis, the Cronbach alpha value of the scale was shown as 0.769 for "Restriction" subscale, 0.895 for "Shape Concerns" subscale, 0.792 for "Weight Concerns" subscale and 0.70 for "Eating Concerns" subscale.

Short Form of Quality of Life Scale (SF-36): It is a scale that is widely used in the measurement of quality of life and is sensitive to detecting small changes in health. Turkish validity and reliability in our country was also done by Koçyiğit et al. (1999).

Statistical Analysis

The research data were analysed by being transferred to the statistical software "SPSS (Statistical Package for Social Sciences) for Windows 26.0 (SPSS Inc, Chicago, IL)". Numbers and percentages were used in summarizing the qualitative data, whereas mean, standard deviation, minimum and maximum values were used in summarizing the measurable data. The Kolmogorov-Smirnov test was used to test the fit of the measurement data to the normal distribution, the Student-t Test was used to compare two independent variables that fit the normal distribution, the ANOVA Test was used to compare 3 or more variables that fit the normal distribution. Mann Whitney U test was used in the analysis of 2 independent variables that did not fit the normal distribution, and the Kruskal-Wallis H Test was used in the analysis of 3 or more independent variables. The Chi-square test was used to compare categorical data. In the correlation analysis of the measurable data, the Pearson's R was used for the data fitting to the normal distribution, and the Spearman's Rho was used for the data not fitting to the normal distribution. $p<0.05$ was considered statistically significant.

RESULTS

When sociodemographic data were examined, 34 of the BD individuals were female (44.7%) and 42 were male (55.3%), while 35 of the control group were female (47.3%) and 39 were male (52.7%). The mean age of the BD group was 40.9±10.3 years, and the mean age of the healthy control group was 41±10.4 years. There was no significant difference between the BD individuals and healthy controls in terms of age, gender, and duration of education. The sociodemographic data of the participants are shown in Table 1 (Table 1).

When the scale scores of individuals with BD and healthy controls were examined; reward responsiveness (p=0.003), drive (p=0.004) and fun seeking (p=0.029) subscales of the DAS scale were found to be significantly higher in the BD group. The scores of NEQ (p<0.001) and EAT (p<0.001) used to evaluate eating behaviors were significantly higher in the BD group. In addition, eating concern (p<0.001), weight concern (p<0.001), shape concern (p=0.006) subscale scores of EDE-Q and global score of EDE-Q (p<0.001) were also significantly higher. Physical functionality (p=0.003), role limitations (physical) (p<0.001), social functionality (p<0.001) and role limitations (emotional) (p<0.001) subscale scores of the SF-36 scale were found to be significantly lower in the BD group. Comparison of individuals with BD and healthy controls and scale scores are shown in Table 2.

When BD individuals with ED and BD individuals without ED were compared, no significant difference was found in age, gender, years of education, duration of BD disease and

Table 1. Sociodemographic Datas in Bipolar Disorder Patient and Healthy Control Groups

	BD (n= 76)	Control (n= 74)	p
Age (years)	40.9 ± 10.3	41 ± 10.4	0.944
Women %	%44.7 (34)	%47.3 (35)	0.754
Men %	%55.3 (42)	%52.7 (39)	0.821
Education (years)	11 ± 3,8	10.9 ± 3.8	0.929

Data are expressed and mean ± standard deviation or (%).

Table 2. Comparison of Scale Scores between Individuals with Bipolar Disorder (BD) and Healthy Control Group

	BD (n= 76)	Control (n= 74)	p
BIS	20.4 ± 3	18.7 ± 2.4	0.142
BAS			
Reward responsiveness	17.6 ± 2.1	16.6 ± 1.8	**0.003**
Fun seeking	12.9 ± 1.7	11.4 ± 2.2	**0.029**
Drive	12.5 ± 2	10.1 ± 2.5	**0.004**
NEQ	19.1±10.3	11 ±5.7	**<0.001**
EAT	23 ±11.8	16 ±8.2	**<0.001**
EDE-Q			
Restraint	1.7±1.8	1.2±1.5	0.53
Eating Concern	1.5±1.6	0.6±1	**<0.001**
Shape Concern	2 ±1.7	1.3 ±1.7	**0.006**
Weight Concern	1.8±1.5	0.9±1.1	**<0.001**
Total	1.7±1.4	1±1.1	**<0.001**
SF-36			
Physical functionality	76.3±22.9	86.1 ±16.9	**0.003**
Role limitations (physical)	53 ±38,1	83.4 ±28.5	**<0.001**
Pain	68.8±20.6	72.9 ±21.2	0.227
General health	57.9 ±21.5	62 ±20.6	0.245
Vitality (energy)	55.8 ±20.3	60.2 ±21	0.202
Social functionality	64.4 ±22. 2	79.9±19.6	**<0.001**
Role limitations (emotional)	47.5 ±36.6	68.7 ±37.2	**<0.001**
Mental health	66.6 ±42.3	66.7 ± 14.2	0.992

BIS/BAS : Behavioral Inhibition System / Behavioral Activation System, NEQ: Night Eating Questionnaire, EAT: Eating Attitude Test, EDE-Q: Eating Disorder Examination Questionnaire, SF-36: Short Form of Quality of Life Scale
Data are expressed and mean ± standard deviation or (%).

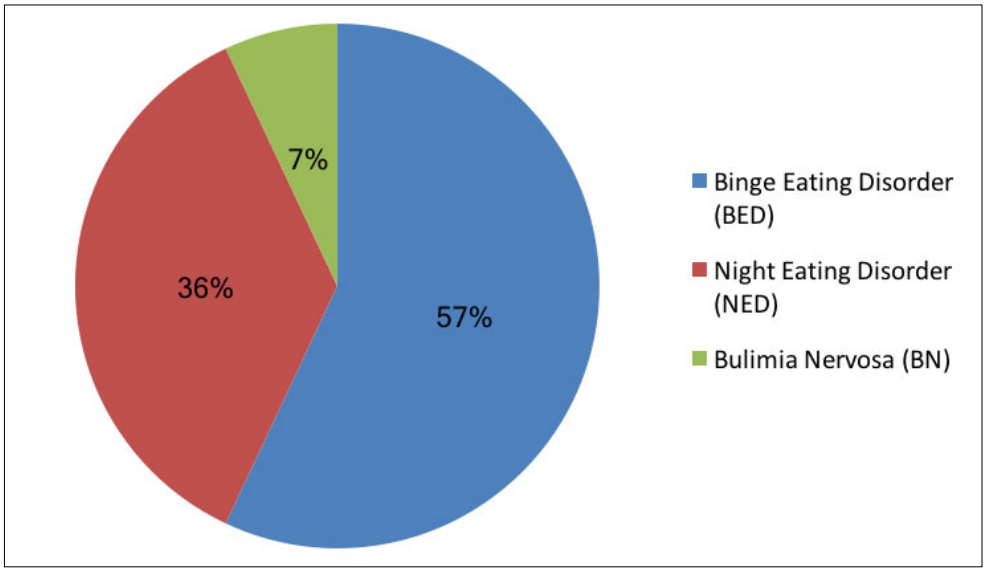

Figure 1. Distribution of Eating Disorders in the BD group.

Table 3. Sociodemographic and Clinical Variables of Bipolar Disorder Patients with Eating Disorder, Bipolar Disorder Patients Without Eating Disorders and Control Groups

	BD with ED (n=14)	BD without ED (n=62)	Control (n=74)	p
Age (years)	38.1 ± 8.3	41.3 ± 10.5	41 ± 10.3	0.540
Women %	%28.6 (4)	%48.4 (30)	% 47.3 (35)	0.395
Men %	% 71.4 (10)	%51.6 (32)	% 52.7 (39)	0.386
Education (years)	11.6 ± 3.2	10.8 ± 3.9	10.9 ± 3.8	0.800
Duration of BD	13.4 ± 7.9	15.9 ± 9.1		0.363
Onset age of BD (years)	24.7 ± 5.6	25.6 ± 9.5		0.736
BIS	21 ± 3.7	20.2 ± 3	18.7	**0.001**
BAS				
Reward responsiveness	17.7 ± 1.6	17.5 ± 2.	2 16.6 ±1.9	**0.011**
Fun seeking	13.6 ± 1.9	12.8 ± 1.6	11.4 ±2.3	**<0.001**
Drive	13.8± 1.8	12.2± 2	10.2 ± 2.5	**<0.001**
NEQ	31.4 ± 12	16.4 ± 8	11 ± 5.7	**<0.001**
EAT	37.8 ± 12.3	19.4 ± 8.8	16 ± 8.2	**<0.001**
EDE-Q				
Eating Concern	3.9 ± 1.5	0.9 ± 0.9	0.6 ± 1	**<0.001**
Shape Concern	4 ± 1	1.6 ± 1.5	1.3 ± 1.8	**<0.001**
Shape Concern	3.6 ± 1	1.4 ± 1.3	0.9 ± 1.2	**<0.001**
Restraint	2.8 ± 1.8	1.4 ± 1.5	1.2 ± 1.6	**0.004**
Total	3.5 ± 1	1.3 ± 1.1	1 ± 1.2	**<0.001**
SF 36				
Physical functionality	61.8 ± 26.3	79.7 ± 20.7	86.1 ±16.9	**0.001**
Role limitations (physical)	37.5 ± 36.4	57.3 ± 37.4	83.4 ± 28.5	**<0.001**
Pain	62.6 ± 24	70.4 ± 19.5	72.9 ± 21.2	0.233
General health	46.6 ± 27.4	60.8 ± 18.8	62 ± 20.6	**0.037**
Vitality (energy)	40,7 ± 22,5	59.8 ± 17.2	60.3 ± 21	**0.004**
Social functionality	52.7 ± 24.1	67.3 ± 20.6	79.9 ± 19.6	**<0.001**
Role limitations (emotional)	40.4 ± 43.7	51.3 ± 34.4	68.7 ± 37.2	**0.004**
Mental health	50,9 ± 14,5	70.1 ± 45	66.7 ± 14.2	**0.021**

BIS/BAS : Behavioral Inhibition System / Behavioral Activation System, NEQ: Night Eating Questionnaire, EAT: Eating Attitude Test, EDE-Q: Eating Disorder Examination Questionnaire, SF-36: Short Form of Quality of Life Scale
Data are expressed and mean ± standard deviation or (%).

Table 4. The results of correlation analysis of Bipolar Disorder Patients with Eating Disorder

Features		EAT		NEQ		EDE-Q									
						Global		Restraint		Eating Concern		Shape Concern		Weight Concern	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p
BIS		.24	.408	-.032	.914	-.086	.769	.218	.454	-.336	.24	-.13	.656	-.05	.841
	RR	-.084	.775	-.201	.492	.143	.626	-.129	.661	.123	.676	.333	.244	.246	.398
BAS	FS	-.12	.682	-.408	.148	.409	.146	.025	.934	.325	.256	.576	**.031**	.502	.068
	Drive	-.109	.071	-.335	.242	.143	.626	.218	.454	.123	.676	-.13	.656	.158	.59

Features		SF-36															
		Physical Functionality		Role Limitations (physical)		Pain		General Health		Vitality (energy)		Social Functionality		Role Limitations (emotional)		Mental Health	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
BIS		0.212	0.467	-0.072	0.806	0.103	0.726	-0.777	**0.001**	-0.406	0.150	0.251	0.387	-0.128	0.664	-0.545	**0.044**
	RR	0.004	0.989	-0.133	0.650	-0.622	**0.017**	0.287	0.321	-0.273	0.345	-0.204	0.484	-0.261	0.368	0.132	0.654
BAS	FS	0.092	0.753	-0.298	0.301	-0.199	0.496	0.314	0.274	-0.195	0.504	-0.234	0.421	-0.153	0.601	0.109	0.711
	Drive	-0.024	0.939	-0.337	0.239	-0.062	0.833	0.337	0.239	0.061	0.836	-0.163	0.579	-0.012	0.969	0.143	0.626

BIS/BAS : Behavioral Inhibition System / Behavioral Activation System, RR: reward responsiveness, FS: fun seeking, NEQ: Night Eating Questionnaire, EAT: Eating Attitude Test, EDE-Q: Eating Disorder Examination Questionnaire, SF-36: Short Form of Quality of Life Scale.
Data are expressed and mean ± standard deviation or (%).

Table 50. The results of Correlation Analysis of Bipolar Disorder Patients without Eating Disorder

Features		EAT		NEQ		EDE-Q									
						Global		Restraint		Eating Concern		Shape Concern		Weight Concern	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p
BIS		-0.107	0.409	-0.032	0.914	0.175	0.175	0.171	0.184	0.012	0.928	0.148	0.251	0.251	0.049
	RR	0.041	0.752	0.005	0.969	-0.114	0.379	0.137	0.289	-0.086	-0.62	-0.24	0.057	0.008	0.951
BAS	FS	0.069	0.593	-0.179	0.163	0.108	0.404	0.24	0.06	0.141	0.275	-0.02	0.83	0.025	0.85
	Drive	0.041	0.752	-0.072	0.578	-0.114	0.379	0.171	0.184	-0.086	0.148	-0.02	00.57	-0.173	0.180

Features		SF-36															
		Physical Functionality		Role Limitations (physical)		Pain		General Health		Vitality (energy)		Social Functionality		Role Limitations (emotional)		Mental Health	
		r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
BIS		0.019	0.884	-0.237	0.064	0.043	0.740	-0.093	0.474	-0.118	0.360	-0.028	0.829	-0.174	0.176	-0.071	0.584
	RR	0.179	0.163	0.161	0.211	-0.090	0.484	-0.091	0.483	-0.117	0.365	-0.084	0.516	-0.129	0.317	-0.016	0.901
BAS	FS	-0.173	0.178	-0.068	0.598	-0.139	0.280	0.036	0.783	-0.061	0.637	-0.184	0.152	0.014	0.912	0.036	0.781
	Drive	0.136	0.291	0.026	0.842	0.115	0.372	0.110	0.393	-0.107	0.406	-0.151	0.241	-0.107	00.407	0.111	0.392

BIS/BAS : Behavioral Inhibition System / Behavioral Activation System, RR: reward responsiveness, FS: fun seeking, NEQ: Night Eating Questionnaire, EAT: Eating Attitude Test, EDE-Q: Eating Disorder Examination Questionnaire, SF-36: Short Form of Quality of Life Scale
Data are expressed and mean ± standard deviation or (%)0.

age of onset of BD. In BD group with ED, drive subscale score (p=0.009) on the BAS scale, the NEQ (p<0.001) score and EAT (p<0.001) score were significantly higher. Global score (p<0.001) and eating concerns (p<0.001), weight concerns (p<0.001), shape concerns (p<0.001) and restraint (p=0.005) subscale scores of the EDE-Q scale were also significantly higher. In addition, physical functionality (p=0.007), general health (p=0.022), vitality (p=0.001) and social functionality (p=0.023) subscales of the SF-36 scale were significantly lower in the BD group with ED.

In this study, patients were examined in terms of eating disorders. In individuals with BD, eating disorders were detected in 14 (18.4%) people, of which 8 (10.5%) people had binge-eating disorder (BED), 5 (6.5%) people had Night Eating Disorder (NED) and 1 (1.3%) person had Bulimia Nervosa (BN). In the control group, 1 person (1.3%) was diagnosed with BED. The incidence of eating disorders in the group of individuals with BD was found to be significantly higher than the control group (p=0.001). The data are shown in Figure 1.

When individuals with BD accompanied by ED, individuals with BD without ED and healthy controls were compared,

the BIS scale (p=0.001) and BAS scale's reward responsiveness (p=0.011), fun seeking (p<0.001) and drive (p=0.009) subscale scores were significantly highest in the BD group accompanied by ED. Again, the NEQ (p<0.001), EAT (p<0.001) and EDE-Q's global (p<0.001) and eating concerns (p<0.001), weight concerns (p<0.001), shape concerns (p<0.001) and restraint (p=0.004) subscale scores were significantly the highest in the BD group with accompanying ED. Additionally, physical functionality (p=0.001), role limitations (physical) (p<0.001), general health (p=0.037), vitality (p=0.004), social functionality (p<0.001), role limitations (emotional) (p=0.004) and mental health (p=0.021) subscales of the SF-36 scale were significantly lowest in the BD group with ED. Data are shown in Table 3.

When the correlations of the BIS/BAS scale and other scales were examined in group of the BD with eating disorders; a positive and moderately significant correlation was found between the fun seeking subscale of the BAS scale and shape concern subscale of the EDE-Q. In addition, there are negative and strong significant correlations between the BIS scale and the general health and mental health subscales of the SF-36 scale. A negative and strong correlation was found between reward responsiveness subscale of the BAS scale and the pain subscale of the SF-36 scale (Table 4).

When the correlations of BIS/BAS scale and other scales were examined in the BD patient group without eating disorders; it isn't showed that significant correlations were observed in the BD patient group with eating disorders. However, a weak and positive correlation was found between the BIS scale and the weight concern subscale of the EDE-Q (Table 5).

DISCUSSION

It was found that frequency of eating disorders was increased in individuals with BD compared to healthy control group in our study. Current literature indicates that the frequency of ED is indeed increased in individuals with BD (McDonald et al. 2019). A review by McAulay et al. (2023) also showed that the prevalence of eating disorders, such as BED and BN, is higher in individuals diagnosed with BD when compared to the healthy controls. This situation has been suggested to support arguments that "binge eating and BD psychopathologies exhibit common phenotypes" (McAulay et al. 2023). The same review also associated this comorbidity with a worse prognosis and reduced quality of life.

It was observed that the most common comorbidity in BD patients participating in our study was BED. Similar to the findings of our study, McElroy et al. (2016) found rate of BED as 12% in their study with patients with BD. In the study of Fornaro et al. (2010) on 148 female patients with BD type I, type II and cyclothymic disorders, the incidence of BED was found to be 14.2%. In another study conducted by McElroy et al. in 2011, 875 BD patients were recruited and incidence of BED was reported to be 8.8%. In a review examining BD and ED, while rate of developing any ED in patients diagnosed with BD was found to be 1.9-33.3%, this rate was found to be 1.8% currently and 3.8% throughout life in the general population (McDonald et al. 2019). When the EDs are examined separately in the same compilation, things get a little more complicated. A review was reported that BN comorbidity in individuals with BD-I ranged from 2.9-5% currently and 1.8-13.7% lifetime; BED or binge eating comorbidities in BD determined as 2.6-30%; BED comorbidity in BD I-II was as 12-28.8% currently and 8.8% lifetime; and lifetime BED comorbidity in bipolar spectrum populations detected as 9.5-14.2% (McDonald et al. 2019). It is seen that comorbidity rates are inconsistent and heterogeneous. This situation is caused by reasons such as BD represents a wide spectrum, addition of BED diagnosis under umbrella of ED with DSM-5 and changes in criteria, the use of different methods in the studies, the preference of different groups such as outpatient/inpatient, the fact that the studies are scale studies and the use of different scales. Therefore, it is useful to be cautious when interpreting the results.

In our study, the BIS scale was found to be insignificantly higher in the BD patient group athan in the control group. However, all three subscales of the BAS scale were found to be statistically significantly higher in the BD patient group compared to the control group. In addition, in our study; there was no significant difference in the BIS scale between with and without comorbid eating disorders in the BD patient group; and drive subscale of the BAS scale was found to be statistically significantly higher in BD patients with eating disorder comorbidity. In line with the literature, these results showed that; the BAS sensitivity is increased in BD, the BAS-drive subscale sensitivity is especially higher in BD patients with a comorbid eating disorder, and BD patients become vulnerable to eating disorders. When control group, BD patients with eating disorders and BD patients without eating disorders were compared in terms of BIS and BAS scales; a statistically significant increase was found in DIS and all subscales of DAS, in BD patients with eating disorders. This situation shows that BAS activation is increased in BD, that BD affects personality structure of patients according to biopsychological model. Perhaps this situation makes patients more sensitive and prepares the ground for additional diagnoses. In addition, it is seen that those with BD and ED comorbidities are the most sensitive group in terms of BIS/BAS.

In the literature, BIS/BAS sensitivities have been considered as markers of vulnerability in mood disorders (Quility et al. 2014). Additionally, BIS/BAS activation has been linked to eating disorders (Şişman 2012). In the studies conducted, it

was found that BD was associated with especially high BAS scale scores, that the BAS fun-seeking and drive subscales were higher than healthy controls, and that BAS score levels and BD symptom severity were positively related; on the other hand, it hasn't been shown the same evidence with the BIS scale score (Quilty et al. 2014). It is also known that BD patients have significant impairments in impulse control both during the illness and during the interim periods and that they may have difficulties in inhibiting eating behaviour (McAulay et al. 2023). This may help explain the observation of ED symptoms in BD patients even if they are not diagnosed with ED.

In our study, BD patients and control groups were also evaluated in terms of eating behaviors and eating pathologies. On the EAT, NEQ scales and EDE-Q's eating concern, shape concern and weight concern subscale scores and total score; a significant height was detected in the BD group, when the whole BD group and controls were compared. When BD patients without ED were compared with healthy controls, it was observed that NEQ (p=0.001) and EAT scores (p=0.044) were statistically significantly higher, while the increase in EDE-Q's global and subscale scores was not significant. These data show that BD affects eating behaviors and that eating pathologies can be discussed even if eating disorders are not accompanied.

Additionally, our study aimed to examine the quality of life of the participants with the SF-36. Compared to the control group, statistically significantly lower scores were found in SF-36's physical functionality, role limitations (physical), social functionality and role limitations emotional subscales in the BD patient group. With these data, it can be said that BD impairs the quality of life of patients. It is seen that there is a significant decrease in physical functionality, general health, vitality and social functionality subscales of the SF-36 scale in BD patients with eating disorder, when BD patients with and without eating disorders are compared. These data show us that the quality of life of patients is more negatively affected in BD and eating disorders comorbidity. It is known that the physical health and quality of life of patients are negatively affected in the presence of comorbid BD and BD (McAulay et al. 2021). The results of our study also support this information. As mentioned in the introduction of the study, it is seen that the symptoms of both diseases in the comorbidity of BD and ED increase bidirectionally and the diseases become more severe, the accompanying psychopathologies intensify and other comorbid mental diseases are added. In other words, the picture becomes even more complicated in the comorbidity of BD and ED. As a result, it is inevitable that the quality of life of patients is negatively affected.

In the correlation analyzes performed on the scale scores of BD patients with eating disorders; it is detected that there is a positive and moderately significant correlation between BAS-fun seeking and EDE-Q body concern, and a negative and moderately significant correlation between BAS-reward responsiveness and SF-36-pain. In addition, it was found that a negative highly significant correlation between BIS and SF-36's general health subscale, and a negative and moderately significant correlation between BIS and SF-36's mental health subscale. When BD patients without eating disorders were examined, a positive but low-level significant correlation was found only between BIS and EDE-Q-weight concern. With these data, it can be concluded that as BIS/BAS activation increases in BD patients with comorbid eating disorders, their quality of life is negatively affected; however, such effects were not observed in the group without eating disorders. Based on these findings; it could be concluded that the quality of life is negatively affected, as BIS/BAS activation increases in BD patients with eating disorders; these effects could not be detected in the group without eating disorders. The coexistence of ED and BD can make it difficult to treat both conditions. There is much evidence in the literature that such comorbidities have negative effects on psychological and physical health. For example, the coexistence of ED with BD can reduce the general quality of life of individuals and complicate treatment processes. In particular, the positive relationship between BAS and EDE-Q body concern indicates that emotional states can affect body perception. The fact that increased BIS/BAS activation negatively affects quality of life suggests that it increases the psychological burden of individuals and impairs their general health status. There are many studies in the literature that high levels of emotional distress reduce quality of life.

There are very few studies examining eating behaviors and psychological processes of their consequences in the BD patient group (McAulay et al. 2023). Studies on psychological interventions for the treatment of this comorbidity are also insufficient (McAulay et al. 2021). This study aimed to evaluate personality traits, eating behaviors, and quality of life in the presence of comorbidity of BD and ED with existing scales and to identify possible interactions. The fact that the strengths of this study are the implementation of SCID-I to all participants, which is a structured interview in terms of diagnostic evaluation, the strict adherence to inclusion and exclusion criteria, providing homogeneity in terms of sample by including BD patients in the euthymic period, the application of all scales by the clinician.

However, the limitations of the study are the sample size of the study, its cross-sectional design and being conducted in a single centre, the treatments used by the patients were not included in the study, weight and metabolic evaluations were not made, physical diseases and dietary habits were not examined. Moreover, our study was conducted with patients who were regularly monitored in a university clinic and had an average disease duration of 15.4±1 years (max 39, min 2).

The long duration of the disease may have caused an increase in the medication load used by the patients and the biological effect of the disease on personality. This could maybe explain the increased rates of pathology in patients' eating behaviors. Similar studies are needed in younger BD patients with shorter disease duration.

There is insufficient information in the literature on the comorbidity of BD and ED, and it is thought that this comorbidity is often overlooked (McAulay et al. 2019). Although it is thought that one in three patients with BD has ED, the contribution of these two diseases to each other has been evaluated very little (McAulay et al. 2019). The reasons for this situation may be the difficulties in recognizing these two disease groups, the lack of knowledge due to insufficient studies in this area, the low recognition of these diseases among clinicians, and the fact that diagnoses such as BED or night eating syndrome have recently been added to the literature. On the other hand, it needs to be examined in detail not only patients at the diagnostic level but also patients with subthreshold symptoms for ED. There are also deficiencies in this area in the literature. Although this study has its shortcomings, it is obvious that it will contribute to the literature in understanding the relationship between BD and ED. The common etiopathology of BD and eating disorders can be understood by means of prospective studies with larger samples to be conducted in this area; and in this way, new treatment approaches can be addressed in comorbid conditions.

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