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ORIGINAL ARTICLE

The effect of cognitive symptoms in binge eating disorder on depression and self-esteem: a cross-sectional study

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Abstract

Purpose To compare individuals with class II and III obesity with and without binge eating disorder (BED) in terms of sociodemographic characteristics, depressive symptoms, self-esteem, eating behaviors, and cognitive variables thought to be involved in the pathophysiology of the disease.

Methods The participants were selected from volunteer patients with body mass index ≥ 35 applying to the Ondokuz Mayıs University Medical Faculty, Turkey, for bariatric surgery between 01.07.2016 and 31.05.2019. The Beck Depression Inventory (BDI), Rosenberg Self-Esteem Scale (RSES), and Eating Disorder Examination Questionnaire (EDE-Q) were administered to all participants.

Results Binge eating disorder (BED) was determined in 95 (34%) of the 278 individuals applying for bariatric surgery. The frequency of previous psychiatric diseases was higher in the BED group than in the non-BED group. BDI, RSES, total EDE-Q, weight concern, shape concern, and eating concern EDE-Q subscale scores were also higher in the BED group. Correlation analysis revealed positive low correlation between depression scores and total EDE-Q scores and all subscales scores, with the exception of restraint. Positive low correlation was determined between decreased self-esteem and body weight and shape concern. At multivariate regression analysis, cognitive variables explained 28.6% of variance in depressive symptoms in the BED group, and 21.5% of variance in self-esteem.

Conclusion The study results showed elevation in cognitive factors in patients with BED compared to the controls. Among these variables, eating and weight concern were shown to be associated with depressive symptoms, while eating concern was linked to self-esteem.

Level of evidence Level III, case-control analytic study.

Keywords Obesity · Binge eating · Depression · Self-esteem · Body image · Body weight

Introduction

Binge eating disorder (BED) is an eating disorder characterized by episodes in which the individual's control over his eating behavior is lost and she/he consumes more than most individuals would in a similar period of time [1]. Sixty-seven percent of BED patients have been found to be overweight [2]. The prevalence of BED among obese patients undergoing bariatric surgery in previous studies ranges between 2 and 53% due to differences in methods and sampling [3].

According to the Beck cognitive model, individuals' underlying thoughts concerning their surroundings and themselves can lead to problems by affecting their emotions and behaviors [4]. In this model, thoughts may assume the forms of automatic thoughts, intermediate beliefs, and core beliefs. These thoughts determine how the individual perceives self, others, and the world. Overvaluation of shape and weight can generally be underlying cognitive variables in patients with BED [5].

Although cognitive elements of the disease are emphasized in addition to pathologies observed in eating behavior in the identification of anorexia nervosa and bulimia nervosa

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in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5), no reference is made to cognitive elements in the diagnostic criteria for BED [1]. However, the number of studies investigating cognitive processes in BED and the effect of these cognitions on the disease has increased in recent years [6]. Duarte et al. [7] showed similar cognitive processes in BED to those in anorexia nervosa and bulimia nervosa. Studies have also shown that negative cognitions concerning body weight and shape in particular are more common in BED compared with control groups.

No relationship has been found between severity of preoccupation with body weight and shape in BED and body mass index. In other words, no difference exists between obese and non-obese BED patients in terms of these findings [8]. More severe depressive symptoms and higher scores on the Eating Disorder Examination Questionnaire (EDE-Q) indicating more severe eating disorder have been reported in BED patients with overvaluation of shape and overvaluation of weight [9]. No difference has been determined in terms of EDE-Q scale scores between BED patients with low anxiety concerning body weight and body shape and a control group diagnosed with obesity, and no difference has been observed in their quality of life [10]. Overvaluations of weight and shape, even if depressive symptoms are controlled, have been found to be effective in the classification of BED [11]. Negative cognitions in the evaluation of body weight and shape in BED are reported to be potentially associated with negative treatment outcomes [12]. In the light of all this information, the presence in BED of such cognitive processes as dissatisfaction with and overvaluation of body weight and shape may be expected to play an important role in the development of disease and treatment planning.

The present research investigated individuals with body mass index (BMI) ≥ 35 (class II and III obesity) applying for bariatric surgery in terms of BED. Individuals with class II and III obesity with and without BED were compared in terms of sociodemographic characteristics, depressive symptoms, self-esteem, eating behaviors, and cognitive variables thought to be involved in the pathophysiology of the disease (eating, body weight, and body shape concern).

Methods

Participants

The participants in this cross-sectional study were selected from volunteer patients with BMI ≥ 35 applying to the Ondokuz Mayıs University Medical Faculty, Turkey, for bariatric surgery between 01.07.2016 and 31.05.2019. Exclusion criteria were diagnosis of an eating disorder other than BED based on DSM-5, and inability to read and write. Diagnosis of BED was based on psychiatric clinical interviews and SCID-5. This examination was performed by a psychiatrist. At the end of this process, patients were divided into two groups, BED (*n*: 95) and non-BED (*n*: 183). A sociodemographic data form, the Beck Depression Inventory (BDI), the Rosenberg Self-Esteem Scale (RSES) and EDE-Q were applied to the included patients before bariatric surgery.

Evaluation tools

Sociodemographic data form

The sociodemographic data form was completed during face-to-face interviews with patients. The patient's address, telephone number, age, sex, marital status, education status, BMI, previous psychiatric diagnoses, and psychiatric drugs used, current psychiatric diagnoses and drugs used, and chronic physical diseases and drugs used were recorded onto the sociodemographic data form.

Beck Depression Inventory

The BDI is a 21-item self-report scale. Each item contains four options describing the individual's mental state, from which the patient selects the most appropriate one [13]. Total possible scores range from 0 to 63. Higher scores indicate greater severity of depression. The validity and reliability of the Turkish-language version have previously been confirmed [14].

Rosenberg Self-Esteem Scale

The RSES was employed to measure self-esteem. This scale consists of 10 questions. Scores range from 0 to 6, higher scores indicating lower self-esteem. The validity and reliability of the Turkish-language version were studied by Çuhadaroğlu [15].

Eating Disorder Examination Questionnaire

The EDE-Q consists of 28 items [16]. The validity and reliability of the Turkish-language version have previously been confirmed [17]. The scale has five subscales—weight concern, eating concern, shape concern, restraint, and binge eating. The binge eating subscale is not scored. In calculating the score from the other subscales, the mean score of the total subscale scores is evaluated. The total scale score is calculated from the total of the weight concern, eating concern, shape concern, and restraint scores. Higher scores indicate increased eating disorder psychopathology.

Application

All patients were weighed and measured by a general surgery physician (G.S.Ö.) in the general surgery clinic. The same calibrated weighing machine and stadiometer were employed for measurement. The patient's BMI (kg/m^2) was calculated from these data and recorded onto the sociodemographic data form. Sociodemographic data were completed by the psychiatrist during psychological examination before bariatric surgery. Following these procedures, the BDI, RSES, and EDE-Q were administered to all participants by the same psychologist. The procedure lasted approximately 45 min for each patient.

Statistical analysis

SPSS 15.0 software was used for statistical analysis. Compatibility with normal distribution was assessed using the Kolmogorov Smirnov Test. Since the data were normally distributed, parametric analysis was applied. The Chi-square test was used to compare categorical data, and the independent samples *t* test was employed to compare qualitative data between two independent groups. Relationships between total BDI, RSES, and EDE-Q scores and subscale scores in the BED group were evaluated using the Pearson Product-Moment Correlation Coefficient. During interpretation of effect sizes based on the correlation coefficients (*r*), 0.00–0.30 was regarded as very low correlation, 0.30–0.50 as low, 0.50–0.70 as moderate, 0.70–0.90 as high, and 0.90–1.00 as very high. Relationships between EDE-Q cognitive subscales (concern over eating, body shape, and weight) and depressive symptoms and self-esteem were evaluated using multivariate regression analysis.

Results

Two hundred and seventy-eight patients meeting the inclusion criteria between the study dates were enrolled in the study. Participants' clinical data are shown in Table 1. BED was determined in 95 (34%) of the 278 individuals applying for bariatric surgery. No statistically significant difference was determined between the groups in terms of age, sex, BMI, occupation, education level, or number of chronic diseases. Mean BMI was 43.91 ± 6.19 (min–max: 43.8–64.7) in the BED group and 44.42 ± 7.05 (min–max: 38.7–69.8) in the non-BED group. The frequency of previous psychiatric diseases was higher in the BED group than in the non-BED group.

A comparison of the groups in terms of BDI, RSES, and EDE-Q subscales is shown in Table 2. BDI, RSES, and total EDE-Q scores were higher in the BED group. Weight concern, shape concern, and eating concern EDE-Q subscale

Table 1 Clinical features of groups with BED and non-BED

	BED +	BED −	*P* value
Sex			
M	72	127	0.263
F	23	56	
Age	36.92 ± 11.00	38.44 ± 12.27	0.315
BMI	43.91 ± 6.19	44.42 ± 7.05	0.555
Number of chronic disease, *n* ± SD	1.21 ± 0.98	1.14 ± 1.15	0.681
Number of drug used	1.64 ± 2.18	1.77 ± 2.31	0.699
Marital status			
Married	57	123	0.308
Single	31	44	
Others	7	16	
Education level, years			
0–5	21	35	0.828
6–8	9	21	
8–11	27	47	
> 11	38	80	
Occupation			
Student	8	12	0.773
Not working	38	65	
Working	43	92	
Retired	6	14	
Previous psychiatric disease			
Var	39	46	0.006
Yok	55	135	

BED binge eating disorders, *BMI* body mass index

Table 2 Comparison of the groups in terms of BDI, RSES, and EDE-Q subscales

Scales	Groups	Mean ± SD	*T* value	*P* value
RSES	BED	1.78 ± 1.09	4.997	0.000
	Non-BED	1.14 ± 0.77		
BDI	BED	18.74 ± 8.85	4.907	0.000
	Non-BED	13.00 ± 9.08		
WC	BED	3.71 ± 1.29	2.951	0.003
	Non-BED	3.16 ± 1.53		
EC	BED	2.40 ± 1.48	6.062	0.000
	Non-BED	1.33 ± 1.33		
SC	BED	4.34 ± 1.34	3.120	0.002
	Non-BED	3.77 ± 1.57		
Restrain	BED	1.81 ± 1.35	0.677	0.499
	Non-BED	1.69 ± 1.47		
EDE-Q	BED	3.27 ± 1.09	3.760	0.000
	Non-BED	2.70 ± 1.23		

BED binge eating disorders, *RSES* Rosenberg Self-Esteem Scale, *BDI* Beck Depression Inventory, *WC* weight concern, *EC* eating concern, *SC* shape concern, *EDE-Q* Eating Disorder Examination Questionnaire

scores were also higher in the BED group. No difference was observed between the groups in terms of restraint behavior.

Correlation values between the variables in the BED group are shown in Table 3. This correlation analysis revealed positive moderate correlation between depression scores and self-esteem in the BED group, and positive low correlation between depression scores and total EDE-Q scores and all subscales scores with the exception of restraint. Positive low correlation was determined between decreased self-esteem and body weight and shape concern. Positive low correlation was determined between restraint and weight, shape, and eating concern. Weight concern exhibited positive moderate correlation with eating concern, and positive high correlation with shape concern. Eating concern was positively moderately correlated with shape concern. We attributed the presence of positive and very high correlation between total EDE-Q scores and EDE-Q subscales (eating concern, weight concern, shape concern, and restraint) to the manner in which the total score was calculated (as the total of the subscale scores).

At multivariate regression analysis (Table 4), cognitive variables explained 28.6% of variance in depressive symptoms in the BED group, and 21.5% of variance in self-esteem. Depressive symptoms emerged as significantly associated with weight and eating concern, and self-esteem as significantly related to eating concern.

Discussion

Elevation in depression and self-esteem scores indicating a higher level of psychopathology was observed in class II and III obesity patients with BED compared to those without BED. These findings are supported by the higher frequency of history of psychiatric disease in individuals with BED. Elevation was determined in scores evaluating cognitive processes, such as weight concern, eating concern, and shape concern, thought to be play an important role in explaining the etiology of the disease, even though these have not been included among the DSM-5 diagnostic criteria for BED in recent years. Depressive symptoms were found to be associated with eating concern and weight concern in BED; while, self-esteem was associated with eating concern.

Eating restraint is behavior seen in anorexia nervosa and bulimia nervosa [1]. Since BED is an eating disorder characterized by excessive food consumption in a specific period of time, the absence of any difference in eating restraint behavior compared to the control group is an expected finding.

Greater severity of depression and low quality of life in BED have frequently been observed in studies concerning depression and self-esteem in the disorder [18].

Table 3 Correlation analysis in BED group

Variables	1	2	3	4	5	6
BDI (1)	1					
RSES (2)	0.659**	1				
EDE-Q (3)	0.336**	0.263	1			
WC (4)	0.350**	0.307**	0.849**	1		
EC (5)	0.368**	0.233	0.818**	0.608**	1	
SC (6)	0.320**	0.324**	0.907**	0.782**	0.637**	1
Restraint (7)	0.030	−0.047	0.683**	0.442**	0.439**	0.448**

r values are given

BDI Beck Depression Inventory, *RSES* Rosenberg Self-Esteem Scale, *EDE-Q* Eating Disorder Examination Questionnaire, *WC* weight concern, *EC* eating concern, *SC* shape concern

*Correlation is significant at the 0.05 level

**Correlation is significant at the 0.01 level

Table 4 Regression analysis of depressive symptoms and self-esteem with cognitive variables

Dependent variables	Predictors	Beta	*T* value	Sign	Adjusted R^2	R^2	*F*
Depression	*WC*	0.229	2.267	0.024	0.278	0.286	37.146
	EC	0.126	3.454	0.001			
	SC	0.239	1.259	0.209			
Self-Esteem	WC	0.115	1.106	0.270	0.208	0.215	26.137
	EC	0.248	3.480	0.001			
	SC	0.155	1.523	0.129			

WC weight concern, *EC* eating concern, *SC* shape concern

Approximately, 32% of individuals with BED have been found to meet major depressive period diagnostic criteria [19]. This comorbidity of depressive findings and BED is explained by negative emotions triggering binge eating episodes and, thus, persistence of the condition [20]. When cases of BED are classified as mild, moderate, or severe according to DSM-5, eating disorder psychopathology and depressive symptoms have been found to increase in line with disease severity [21]. A high level of depression and low self-esteem have been reported in BED patients who overvalue weight and shape compared to patients with fewer such anxieties [22]. Obese patients with BED are thought to have low self-esteem, which may be associated with dissatisfaction with body shape [23]. Self-esteem is at the same time associated with depression, which can lead to increased depression-mediated negative thoughts concerning body shape and weight [24]. A change in these cognitions through cognitive behavioral therapy has been found to be capable of mediating changes in depression and self-esteem [25]. In the light of these previous studies, the high depression and decreased self-esteem, and the association between these and cognitive elements in the present study is consistent with the current literature.

Eating, weight, and shape concern scores, thought to explain cognitive processes in BED, were significantly higher compared to the control group in this study. At the same time, a significant correlation was found between these cognitive variables. Increasing evidence has emerged in recent years that BED may not be solely a disease characterized by episodes in which eating control is lost, and that the disease must be evaluated in terms of cognitive processes. Wang et al. [6] reported that overvaluation of shape may be a basic symptom of BED. In contrast, Grilo [8] reported that not only overvaluation of shape, but also overvaluation of weight were associated with the severity of the disease and can be used as negative prognostic markers. It has been suggested that overvaluation of weight and shape may yield more accurate results than existing disease severity markers in DSM-5 in determining the severity of BED [21]. Dissatisfaction with body weight is frequently seen in BED, with individuals regarding themselves as fat and the majority wishing to lose weight [26]. Individuals with BED have been found to exhibit negative feelings, such as shame, when looking at their own bodies in the mirror, and to dislike their bodies [27]. Various stressful life events are known to trigger body shape dissatisfaction in BED and to be capable of leading to BED episodes [28]. Pacanowki et al. [29] showed that during their treatment of BED patients followed up with cognitive behavioral therapy, patients lost more weight as their concerns over body shape and weight decreased. Svaldi et al. [20] reported that negative affect such as sadness and anxiety increased in a BED group after showing a body-related video clip trigger compared to a non-BED group, together with a simultaneous increase in the desire to binge eat. Those authors attributed this change in the BED group to the high initial levels of body shape and weight concern in the group.

Consistent with the previous studies, weight, eating, and shape concern were higher among BED patients in the present study compared to patients without BED. This finding supports previous studies indicating that cognitive processes thought to affect the emergence of the disease should be evaluated and included among the diagnostic criteria when diagnosing BED, rather than focusing on the disease's impact on eating behavior and functioning [30].

The facts that eating concern was associated with depressive symptoms and self-esteem, while weight concern was linked to depressive symptoms emerge as new findings in the literature in the present study. The fact that shape concern was not associated with depressive symptoms and self-esteem may indicate that although shape concern has been revealed to be related to the severity and course of the disease in BED patients, it has no effect on accompanying psychopathologies. According to Duarte et al. [31], eating concern may play a role in the association between BED and shame. Binge eating episodes may emerge to avoid resulting feelings of shame. There is a high probability of BED and depressive symptoms subsequently emerging in individuals with weight overvaluation [32]. The regression analysis results are, therefore, compatible with other information in the literature.

One limitation of the present study is that, as with several previous studies in the field of BED, the groups included in the study were selected from individuals applying for bariatric surgery, and therefore from among patients with class II and III obesity. It may not, therefore, be possible to generalize these results to all patients with BED. Due to the cross-sectional nature of this study, it provides no information about the longitudinal course of the disease. Another limitation is that the effect of psychiatric diseases on outcomes was not evaluated.

What is already known on this subject?

Cognitive processes were already known to be potentially associated with binge eating disorder. However, information about the effect of these variables on psychopathology was limited.

What this study adds?

The study results showed elevation in cognitive factors in patients with BED. Eating and weight concern were shown to be associated with depressive symptoms, while eating concern was linked to self-esteem.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Informed consent Informed consent was obtained from all individual participants included in the study.

Ethical approval This study was approved by Clinical Research Ethics Committee of the Ondokuz Mayıs University.

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