Binge and Emotional Eating in obese subjects seeking weight loss treatment.

Running Title: Binge and Emotional Eating in obesity

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Abstract

Objective: Binge Eating Disorder (BED) is highly prevalent among individuals seeking weight loss treatment. Considering the possible trigger factors for BED, different studies focused on the role of emotional eating. The present study compared threshold, subthreshold BED, and subjects without BED in a population of overweight/obese individuals seeking weight loss treatment, considering the anamnesis, the eating disorder specific and general psychopathology, the organic and psychiatric comorbidity, the emotional eating as a trigger factor for binge eating, and the quality of life.

Design: cross-sectional survey.

Subjects: Four hundred thirty eight overweight subjects seeking weight loss treatment have been enrolled in the study.

Measurements: Subjects have been evaluated by means of a clinical interview (SCID I) and different self-reported questionnaires (Eating Disorder Examination Questionnaire, Binge Eating Scale, Beck Depression Inventory, Spielberg's State-Trait Anxiety Inventory, Symptom Checklist 90, Emotional Eating Scale, and Obesity Related Well-Being questionnaire).

Results: One hundred and five subjects (24% of the sample) fulfilled the DSM-IV criteria of lifetime BED, 146 (33.3%) fulfilled the criteria of lifetime subthreshold BED, and 187 (42.7%) subjects were diagnosed overweight non-BED. No correlations between the binges frequencies and the overweight levels were found. All the three groups showed high psychiatric comorbidities, and the three groups significantly

differed in terms of emotional eating, which was positively correlated to the binge eating frequencies.

Conclusions: Threshold and subthreshold BED deserve a careful psychopathological investigation and emotional eating seems to play a key role as trigger factor for binge eating. Obesity is associated with a high psychiatric comorbidity and a low quality of life, independently from the specific and general eating disorder psychopathology.

Key words: Binge Eating Disorder, Obesity, Emotional Eating, Psychiatric Comorbidity, Quality of Life

Introduction

Obesity is a heterogeneous syndrome which can be considered as the result of the interactions between genetic, social, economic, endocrine, metabolic and psychopathological factors.[1,2] Different studies considered two distinct and specific subgroups of overweight subjects: obese whose eating pattern is characterized by binges, such as to meet the diagnosis of Binge Eating Disorder (BED), and obese without BED.[3] When comparing obese BED and obese non-BED subjects, the BED ones have been shown to have a more severe eating-related psychopathology, a higher axis I, and II comorbidity, and a worse quality of life.[4-13] Current provisional diagnostic criteria for BED require that binges occur at least twice per week for a minimum of 6 months,[14] and the differences between the individuals with high and low frequencies of binge eating have been studied with conflicting results.[15-18] Individuals diagnosed with full blown (threshold) BED reported earlier onset of binge eating, increased food cravings, increased diet pills use, greater fear of weight gain, more severe body perception disturbances, greater drive for thinness and less interoceptive awareness, when compared with those individuals with subthreshold BED (i.e., those who had recurrent binge eating but at a significantly less frequent rate than full BED).[15,18] On the other hand, Striegel-Moore et al.[16] found that BED did not differ from subthreshold BED (having a minimum of one binge episode per week) on dieting, weight history, and body image disturbance.[16] In another study, women with BED and subthreshold BED, after controlling for BMI, did not differ significantly on measures of weight and shape concern, restraint, psychiatric distress, and history of seeking treatment for an eating or weight problem.[19]

Considering the possible factors triggering the binges, different studies focused on the role that emotional states can play in the onset and maintenance of binge eating.[20-22] In particular, some studies evaluated the possible role of emotional eating, defined as ‘‘eating in response to a range of negative emotions such as anxiety, depression, anger, and loneliness to cope with negative affect”[23] in subjects suffering from BED, suggesting that episodes of binge eating are often precipitated by stress and negative affect,[24-27] and that binge eating appears to be associated with a subsequent decrease in negative affect.[28] Furthermore, it has been hypothesized that binge eating is capable of decreasing negative emotional states through the temporary reduction of negative emotions, or the distraction from the aversive emotional states.[29,30]

The aim of the present study was the evaluation of the similarities and differences between threshold, subthreshold BED, and overweight subjects without BED in a population of overweight/obese individuals seeking weight loss treatment, considering the anamnesis, the eating disorder specific and general psychopathology, the organic and psychiatric comorbidity, the emotional eating as a trigger factor for binge eating, and the quality of life.

Methods

Sample

The study was designed as a cross-sectional survey, and was planned by the Psychiatric Unit and by the Section of Metabolic Diseases and Diabetology of the University of Florence (Italy). We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during

this research. The protocol was approved by the Ethics Committee of the Institution. A written informed consent was obtained from each patient after the procedures of the study were fully explained.

The study was performed on a consecutive series of 491 overweight and obese subjects referring for the first time to the Outpatient Clinic for Obesity of the University of Florence. Patients were enrolled from September 2004 to December 2007. All patients were referred to the Clinic by their general practitioner. The exclusion criteria were illiteracy and mental retardation.

Forty seven patients refused to participate in the study and 6 patients were excluded. The final sample consisted of 438 patients (83% women) with a mean (± SD) age of 46.6 ± 13.4 years. Non participants did not differ significantly from participants in age and BMI. Considering that obesity is a complex and heterogeneous clinical condition, we decided to include patients with organic comorbid diseases such as diabetes mellitus, chronic liver disease, hypertension, heart or renal failure, in order to study a representative sample of overweight subjects seeking weight-loss treatment.

The anamnestic and sociodemographic data, as well as the anthropometric measures, were collected by a psychiatrist at the beginning of the visit. Subjects reported their social status, education level, number of children, number of pregnancies, overweight onset, and the presence/absence of previous different attempts to lose weight: number of diets during lifetime, bariatric surgery, and hospitalization for Very Low Calorie Diet (VLCD).

Measures

Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of height in metres. Anthropometric measurements were made using standard calibrated instruments on the day of the psychopathological assessment. Height (meters) was measured using a wall-mounted stadiometer, weight (kilograms) using electronic scales with an upper weight limit of 300 kg. Diagnosis of overweight (BMI >27.5 Kg/M^2) was performed according to a single clinical criterion suggested by recent clinical guidelines developed by the National Heart, Lung and Blood Institute.[31] The main organic comorbidities were assessed.

In order to assess BED, Mood, Anxiety, and Substance Abuse Disorders, patients were interviewed by two expert clinicians (V.R. and G.C.) by means of the Structured Clinical Interview for DSM-IV.[32] According to DSM-IV criteria[14] BED diagnosis was determined by a minimum average frequency of binge eating twice a week for a minimum duration of 6 consecutive months; subthreshold BED diagnosis was performed when binges occurred at a minimum average frequency of once a month for a minimum duration of 6 consecutive months, according to Striegel-Moore et al.[16] Recurrent severe compensatory behaviours (fasting, purging, excessive exercise for weight control) were exclusion criteria for BED. Therefore, in the present study, individuals were excluded from the subthreshold BED or BED groups if they reported a lifetime history of such behaviours at a frequency exceeding five times in any consecutive 6-month period.[16] According to this criteria, the sample was divided into three different clinical groups: threshold (BED),

subthreshold BED (sBED), and overweight/obese non-BED individuals (OVERW).

Quality of life of the overweight subjects was assessed by means the Obesity Related Well-Being (ORWELL 97) questionnaire,[8] which takes into consideration not only the intensity but also the subjective relevance of physical and psychosocial distress. The ORWELL 97 items are conceptually related to: the obesity-related somatic symptoms and physical functioning; the impact of obesity on patients' emotional status, and obesity-related worries; the effects of obesity on familial relationship; role functioning, and social network. For each item, the patient is asked to score the occurrence and/or severity of the symptom (occurrence) and the subjective relevance of the symptom- related impairment in one's own life (relevance). The score of the item is calculated as the product of occurrence and relevance. The total ORWELL 97 score is obtained as the sum of the scores of individual items. Higher ORWELL 97 scores mean a lower quality of life. The sums of the scores related to occurrence (ORWELL 97-O) and relevance (ORWELL 97-R) of symptoms in individual items were also calculated.

Eating attitudes and behaviours were specifically investigated by means of the Eating Disorder Examination Questionnaire (EDE-Q). The EDE-Q consists of 38 items, assessing the core eating disorder (ED) psychopathological features, and contains 4 subscales: dietary restraint, eating concern, weight concern, and shape concern. The dietary restraint subscale is an admixture of cognitions and behaviours pertaining to dietary restriction. The three other subscales evaluate the dysfunctional attitudes regarding eating and overvalued thoughts regarding weight and shape. The global score represents

the mean of the four subscale scores. Different studies showed that EDE-Q has an adequate test–retest reliability,[33] good convergence with the EDE interview, [34-36] and both discriminant and concurrent validity.[37]

In order to measure the severity of binge eating, the Binge Eating Scale (BES) was applied.[38] The BES has been proposed, with a threshold score of 17, as a rapid screening instrument for BED in obese patients, and it examines both behavioural signs (eating large amounts of food) and feeling or cognition during a binge episode (loss of control, guilt, fear of being unable to stop eating) through 16 items.

Emotional eating was assessed by means of the Emotional Eating Scale (EES), a 25-item self-report questionnaire. Each item consists of an emotion term (e.g., jittery, angry, helpless) and the individual is asked to indicate the extent to which experiencing that emotion makes her/him likely to eat (no desire, small desire, moderate desire, strong urge, overwhelming urge).[23,29] The 25 items form three subscales, reflecting eating in response to anger (Anger/Frustration) anxiety (Anxiety), and depressed mood (Depression). These three subscales reflect the emotional antecedents of binge eating and, on each scale, higher scores reflect a greater tendency to eat in response to emotional state. The EES has demonstrated good internal consistency, construct validity, discriminant validity, and criterion-related validity.[23]

For a further characterization of the psychopathological features of the patients, the Beck Depression Inventory (BDI),[39] and Spielberg's State-Trait Anxiety Inventory (STAI)[40] were also applied. Finally, patients were evaluated by means of the Symptom Checklist (SCL 90-R),[41] a psychometric instrument devoted to the identification of the

psychopathological distress. The 90 items of the test, measuring how much a problem distressed the respondents during the previous week (from 0 to 4), are summarized into 9 domains (Somatization, Obsessive-Compulsive thoughts, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid conceiving, Psychotic behaviour), and a General Severity Index (GSI), indicating the overall psychological distress.

Statistical analysis

To compare the characteristics of participants among the three considered groups (BED, subthreshold BED, and overweight non-BED individuals), Chi square (Fisher exact test when appropriate) for categories, ANOVA t test (tukey B *post hoc* test) and Pearson correlation coefficient for continuous variables were used. A value of $p<0.05$ was considered statistically significant.

The three groups described above defined the dependent variable in a multivariate model (ANCOVA) which included EES global score as explicative variable, and age, sex and the clinical variables which significantly differentiate the three groups as confounding factors. Bonferroni correction was also applied. ANOVA t test and *post hoc* Tukey B were used to compare the three EES subscales (Anger/frustration, Anxiety, Depression) scores among BED, sBED, and OVERW individuals. All analyses were performed using SPSS for windows 14.0 (Chicago Inc. – USA).

Results

The results of the different variables taken into account are shown in Table 1.

One hundred and five subjects (24% of the whole sample) fulfilled the DSM-IV criteria of lifetime BED, 146 (33.3%) fulfilled the criteria for lifetime sBED, and 187 (42.7%) subjects were diagnosed OVERW. On the basis of a detailed assessment of the binge episodes in the 3 months preceding the diagnostic interview, BED subjects showed a mean (± SD) number of 10.5 (± 7.5) days, while sBED patients showed a mean (± SD) number of 3.0 (± 1.9) days per month with at least one binge eating episode.

Women were more represented (83 %), especially in the BED group (87.6%), with no significant differences among the three groups, and almost half subjects were married (48%). No significant differences among the three groups were found when considering the demographic variables except for age (p=0.02), with the OVERW subjects showing the highest mean age (49.0 ± 13.8 years). Considering the onset of overweight, 43.3%, 38.6% and 29.9% of BED, sBED and OVERW subjects respectively reported to be overweight during childhood. Hypertension was the most represented organic comorbidity (one hundred and thirty five subjects, 34%).Thirty four subjects (8%) had a diagnosis of diabetes mellitus type 2, 105 subjects (28%) showed hypertriglyceridemia, and 71 (18%) had low HDL cholesterol. BED, sBED, and OVERW subjects did not differ in terms did not differ in terms of diagnosis of diabetes mellitus type 2 (BED: 8.3%; sBED: 11.8%; overw: 9.1%; p=0.63), and when considering the BMI (p=0.80).

No significant differences among the three groups were found when considering the number of diets, previous bariatric surgery interventions, hospitalizations for VLCD, and previous use of anorectic drugs.

The lifetime psychiatric comorbidities of the three groups of patients are summarized in Table 2.

No significant differences were observed among the three groups in terms of Axis I Disorders psychiatric comorbidities, as well as considering the BDI ($p=0.89$), and STAI ($p=0.55$) scores.

No significant differences among the three groups were found in terms of ORWELL 97-total score ($p=0.45$), occurrence (ORWELL 97-O; $p=0.58$) and relevance (ORWELL 97-R; $p=0.17$) of symptoms. No significant correlation was found between BMI and ORWELL 97-total score ($r=0.01$; $p=0.52$), and between EDE-Q global score and ORWELL 97-total score ($r=0.02$; $p=0.61$). BDI significantly correlates with ORWELL 97-total score ($r=0.85$; $p<0.01$), ORWELL 97-O ($r=0.85$; $p<0.01$), and ORWELL 97-R ($r=0.81$; $p<0.01$). STAI state and trait significantly correlate with ORWELL 97-total score ($r=0.54$, $r=0.59$; $p<0.01$), ORWELL 97-O ($r=0.54$, $r=0.60$; $p<0.01$), and ORWELL 97-R ($r=0.52$, $r=0.55$; $p<0.01$). Moreover EES significantly correlates with ORWELL 97-total score ($r=0.28$; $p<0.01$), ORWELL 97-O ($r=0.28$; $p<0.01$) and ORWELL 97-R ($r=0.26$; $p<0.01$); BES significantly correlates with ORWELL 97-total score ($r=0.28$; $p<0.01$), ORWELL 97-O ($r=0.29$; $p<0.01$) and ORWELL 97-R ($r=0.27$; $p<0.01$).

On the other hand, significant differences among the three groups were found when considering the SCL-90 global and subscales (Somatization, Obsessive-Compulsive Disorder, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism) scores. In particular, BED patients showed significantly higher SCL-90 Global and Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, and Phobic Anxiety, Paranoid Ideation, and Psychoticism subscales scores.

No significant difference between the three groups was found in terms of current use of anxiolitics, while a significant higher actual use of antidepressants was found in the BED group.

Considering the eating specific psychopathology of the sample, the BED, sBED, and OVERW patients significantly differed for EDE-Q global score ($p<0.01$) and for Eating Concern ($p<0.01$), Weight concern ($p<0.01$) and Shape concern ($p<0.01$) subscales scores, with BED presenting the highest mean scores, and sBED higher scores than OVERW. Moreover, the *post- hoc* analysis showed that sBED do not differ from OVERW in terms of Shape concern subscale scores.

The same differences were found when comparing the BES scores of the three groups.

When considering the Emotional Eating Global Score, the analysis of covariance (ANCOVA) showed statistically significant differences between the three groups. In particular, the BED patients showed the most severe emotional eating, and sBED showed higher scores than OVERW subjects (Table 1). This was confirmed for both unadjusted ($p<0.01$) and adjusted ($p=0.020$) computations, showing a positive association between emotional eating and the severity of the specific eating psychopathology. Bonferroni correction (with alpha=0.016) confirmed statistical differences among all three groups.

The univariate model (ANOVA) showed statistical significant differences between the three groups for the different EES subscales (Anger/Frustration, $p<0.01$; Anxiety, $p<0.01$; Depression, $p<0.01$), (Table 1).

A significant Pearson correlation between EES Anxiety/Frustration ($r = 0.185$, $p <0.01$), and Depression ($r = 0.166$, $p <0.01$) subscales

scores and the number of diets was found, whereas no significant correlation between the different EES subscales and the BMI was detected. Significant Pearson correlation between all the EES subscales and the EDE-Q global and the EDE-Q subscales scores (Anger/Frustration, $r = 0.425$, $p < 0.01$; Anxiety, $r = 0.376$, $p < 0.01$; Depression, $r = 0.420$, $p<0.01$), except for restraint, were observed. Significant correlations between EES Anger/Frustration ($r = 0.652$, $p < 0.01$), Anxiety ($r = 0.581$, $p < 0.01$) and Depression ($r = 0.653$, $p<0.01$) subscales scores, and the BES scores was observed. Finally a significant correlation between the EES and the number of binge eating episodes/months ($r=0.208$; $p<0.01$) was found; while no significant correlation was found between the number of diets lifetime and the number of binge eating episodes/months ($r=0.053$; $p=0.34$).

Discussion

In the present study, a sample of 438 overweight subjects seeking weight loss treatment was studied. In particular, patients with BED, subthreshold BED and overweight without BED were evaluated by means of a structured clinical interview and different self-reported questionnaires, in order to evaluate similarities and differences in terms of anamnesis, the eating disorder specific and general psychopathology, the emotional eating, the organic and psychiatric comorbidity, and the quality of life.

We found that 24.2% of the patients met the DSM IV criteria for lifetime BED, and 33.3% fulfilled the criteria for subthreshold BED, confirming previous findings about the prevalence and the relevance of clinical significant loss of control over eating in samples of overweight and obese subjects seeking weight loss

treatment.[10,16,17,42-44] Unlike other studies,[18,45] we did not find a significant positive association between the diagnoses of BED and sBED, and the BMI, confirming Streigel-Moore's findings,[16] and our previous observations.[46] The absence of significant differences between the three groups when considering the number of diets, previous bariatric surgery interventions, hospitalizations for VLCD, and previous use of anorectic drugs seems to suggest that overweight subjects, despite the presence or absence of binge eating behaviors, share a common history of attempts in order to lose weight.

Significant group differences were found on the EDE-Q global and subscales scores. BED patients showed higher weight, eating, and shape concern than sBED and OVERW subjects, as previously observed;[47-49] sBED patients scored significantly higher than OVERW on the Weight and Eating concern subscales, and did not differ significantly from OVERW on the Shape Concern subscale score. No differences between the three groups were observed for the Restraint subscale scores, unlike what observed by Guss et al.[50] who found differences in restraint profile between BED and OVERW subjects. Overall, these results suggest that sBED represents a less severe group compared to BED in terms of specific eating psychopathology, unlike Striegel-Moore's observations[16] apart from eating restraint. BED patients showed significantly higher SCL-90 Global and SCL subscales scores, when compared to the sBED and OVERW patients. These results are in accordance with different previous observations[5,7,45,51] suggesting that, regardless of the overweight severity and the comorbidity with different Axis I mental disorders, a high binge eating frequency is associated with a more

severe amount of distress and psychological impairment. Considering the relationships between emotional eating and the loss of control over eating, we found different, significant correlations between BES and EES scores in BED and sBED patients, suggesting the importance of emotional eating in determining the frequency and severity of the binge eating episodes, as already observed.[27,49,52] Moreover, we found a positive association between emotional eating and eating, weight, and shape concerns,[23,27] indicating that emotional eating could be a trigger factor for the loss of control over eating among individuals with threshold and subthreshold BED, and an important target for psychotherapeutical interventions.

As far as the lifetime psychiatric comorbidity is concerned, it is of note that no significant statistical differences among the BED, sBED and OVERW patients were found for the most prevalent Axis I disorders, as well as for the BDI and STAI scores. These results confirm that subthreshold BED show important similarities with full BED[53,54] even when considering the psychiatric comorbidity,[16] and partly contradict previous findings describing significant differences between BED and non-BED subjects.[9,11,49,51,55] Our data seem to suggest that Mood and Anxiety Disorders could be, at least in part, secondary to the weight gain, and not the consequence of patterns of erratic eating,[56] or could support the hypothesis of a significant psychiatric comorbidity/endophenotype between Mood/Anxiety Disorders and obesity.[10,57] However, the relevant lifetime psychiatric comorbidities affecting all the overweight probands indicate that overweight subjects seeking weight loss treatment represent a particular subset of obese subjects, and that the comorbid psychiatric disorders could be a relevant factor to engage in treatment.

BED, s-BED and OVERW probands did not show any significant difference in terms of ORWELL 97 total score, ORWELL 97-O, and ORWELL 97-R subscales scores, suggesting that obesity *per se* determines an impairment of quality of life, independently from the binge eating frequency and the eating-related psychopathology.

Finally, the effects of anxiety and depression on obesity quality of life were confirmed by the significant correlations between BDI and STAI scores, and ORWELL 97 scores. According to previous findings,[8] BDI and STAI positively correlated with ORWELL 97-O and ORWELL 97-R subscales scores, suggesting that higher levels of depression and anxiety are associated with an increased subjective relevance of the impairments determined by being overweight.

In sum, the data obtained demonstrated that threshold and subthreshold BED are common among obese individuals seeking weight loss treatment, and represent not a minority but more than a half of the whole sample (57%). In this population obesity is associated with a high psychiatric comorbidity and a low quality of life, independently from the specific and general eating disorder psychopathology. Threshold and subthreshold BED patients show similarities and differences, from psychopathological and clinical points of view. Although subthreshold BED seems to be less severe in terms of eating specific and general psychopathology, both syndromes deserve a careful psychopathological investigation.

In both groups, emotional eating seems to play a key role as trigger factor of binge eating.

This study has some limitations:

-Being cross-sectional in nature, it does not allow to detect any causal relationship between the variables taken into account.

-Different important data of this study, such as overweight onset, use of psychotropic medications, and presence/absence of previous different attempts to lose weight, were self-reported. This implies that participants might not have provided some important information in a complete or reliable manner.

-Finally, the Clinic for Obesity of the University of Florence provides an integrated medical, nutritional and psychiatric treatment to the overweight subjects. In particular, in our facility the psychopathological features are carefully considered. It is possible that some patients were referred to the Clinic by their general practitioner due to their relevant psychopathological features. For this reason, the data obtained cannot be generalized to other facilities devoted to the treatment of overweight/obese subjects.

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Table 1. **Psychopathological and clinical features in BED, subthreshold BED and overweight non-BED patients**

Characteristics	BED n=105 (24%)	BED subthreshold n=146 (33.3%)	Overweight n-BED n=187 (42.7%)	F	P
gender, female (%)	87.6%	79.5%	83.4%		0.18
age [mean (SD)]	44.9 (12.7)[1]	44.8 (13.1)[1]	49.0 (13.8)	3.85	0.02
social status (%)					0.15
married	47.9%	46.3%	49.7%		
single	22.9%	19.9%	17.0%		
divorced	8.3%	3.7%	4.2%		
widowed	4.2%	0.7%	4.8%		
years of education [mean (SD)]	9.6 (3.5)	9.7 (4.5)	9.5 (3.8)	1.81	0.83
number of children [mean (SD)]	0.9 (0.9)	1.1 (1.0)	0.9 (0.9)	1.88	0.15
number of pregnancies [mean (SD)]	1.1 (1.0)	1.3 (1.2)	1.1 (1.2)	1.09	0.56
overweight during childhood (%)	43.3%	38.6%	29.9%		0.06
number of diets [mean (SD)]	2.8 (3.7)	2.4 (3.1)	2.7 (3.4)	1.42	0.86
BMI [mean (SD)]	38.1 (7.4)	38.5 (5.8)	37.9 (7.1)	0.22	0.80
BDI score [mean (SD)]	13.7 (8.1)	12.7 (7.8)	12.7 (9.3)	0.11	0.89
STAI score [mean (SD)]	44.0 (1.2)	43.5 (1.0)	42.4 (0.9)	0.51	0.55
ORWELL 97-total	54.3 (21.2)	53.0 (20.3)	56.0 (22.2)	0.79	0.45
ORWELL 97-O	30.5 (12.3)	30.9 (12.4)	32.3 (12.5)	0.53	0.58
ORWELL 97-R	23.7 (9.0)	22.1 (8.4)	23.7 (9.9)	1.75	0.17
EDE-Q score [mean (SD)]	3.3 (0.9)[2]	2.6 (0.9)[1]	2.2 (1.1)	28.32	<0.001
Restraint	2.2 (1.3)	1.8 (1.5)	1.8 (1.5)	2.13	0.120
Eating concern	2.9 (1.3)[2]	2.0 (1.3)[1]	1.2 (1.2)	51.91	<0.001
Weight concern	3.6 (1.1)[2]	3.0 (1.1)[1]	2.5 (1.1)	27.58	<0.001
Shape Concern	4.4 (1.2)[2]	3.8 (1.3)	3.5 (2.6)	6.60	0.002
BES score [mean (SD)]	18.6 (7.4)[2]	13.0 (4.9)[1]	10.7 (6.4)	51.95	<0.001
SCL-90-R_GSI	1.1 (0.4)[2]	0.8 (0.4)[1]	0.7 (0.5)	16.44	<0.001
Somatization	15.6 (7.8)[2]	12.2 (6.9)	12.1 (8.4)	7.37	0.001
Obsessive-Compulsive Disorder	10.7 (6.2)[2]	8.0 (5.5)	8.2 (6.2)	7.13	0.001
Interpersonal Sensitivity	10.8 (6.0)[2]	8.0 (5.8)	6.8 (6.2)	13.46	<0.001
Depression	16.9 (9.1)[2]	12.9 (8.6)	12.0 (8.8)	9.86	<0.001
Anxiety	10.2 (5.6)[2]	7.0 (5.1)	6.9 (5.4)	12.98	<0.001
Hostility	5.4 (3.2)[2]	4.1 (3.4)	3.4 (3.4)	10.64	<0.001
Phobic Anxiety	4.0 (4.8)[2]	2.4 (3.7)	2.4 (3.5)	6.39	0.002
Paranoid Ideation	6.7 (3.6)[2]	5.3 (3.5)	4.9 (3.9)	7.62	0.001
Psychoticism	6.9 (4.7)[2]	4.7 (4.5)	4.2 (4.9)	9.89	<0.001
Others	9.0 (4.2)[2]	6.4 (3.9)	5.9 (4.5)	16.88	<0.001
previous use of AD (%)	26.0%	20.6%	24.2%		0.595
previous use of PD (%)	35.4%	15.4%	20.0%		0.001
actual use of PD (%)	35.4%	14.0%	18.8%		< 0.001
antidepressants (%)	27.1%	14.0%	13.3%		0.009
anxiolytics (%)	15.6%	6.6%	10.9%		0.088
gastric surgery (%)	2.1%	0.7%	2.4%		0.521
hospitalization (VLCD) [%]	2.1%	0.7%	1.2%		0.661
EES - total score [Mean (SD)]	1.8 (0.8)[2]	1.2 (0.8)[1]	0.9 (0.8)	34.50	<0.001
EES - Anger/Frustration [Mean (SD)]	1.8 (0.8)[2]	1.3 (0.8)[1]	0.9 (0.8)	34.69	<0.001
EES - Anxiety [Mean (SD)]	1.7 (0.7)[2]	1.2 (1.0)[1]	0.9 (0.7)	25.75	<0.001
EES - Depression [Mean (SD)]	2.1 (0.8)[2]	1.4 (0.8)[1]	1.0 (0.9)	35.78	<0.001

BED: Binge Eating Disorders; AD: Anorectic Drugs; PD: Psychiatric Drug; BES: Binge Eating Scale; SCL-90-R_GSI Symptom Checklist 90 Revised_Global Severity Index; BDI: Beck Depression Inventory; BMI: Body Mass Index; EDE: Eating Disorder Examination. VLCD: very low calory diet . EES: Emotional Eating Scale
Tukey B post hoc test, differences among patients groups: **([1])** higher than the other group; **([2])** : higher than the other two groups

Table 2. Lifetime Axis I Psychiatric Diagnoses in BED, subthreshold BED and overweight non-BED subjects.

AXIS I DISORDER	BED 24% (105)	BED subthreshold 33.3%(146)	Overweight n-BED 42.7%(187)
Adjustment Disorder with Depressed Mood	4.1% (4)	4.2% (4)	4 % (1)
Alcohol abuse	3.8% (4)	3.6% (4)	3.6% (7)
Bipolar Disorder	3.3% (3)	3.1% (3)	3% (6)
Cannabis abuse	6% (5)	5.4% (5)	5.6% (9)
Dysthymia	28.4% (30)	26.6 (39)	27.1 (51)
Generalized Anxiety Disorder	14.9% (15)	14.8% (15)	14.5% (26)
Major Depressive Disorder	7.2% (8)	6.4% (6)	6.7% (13)
Obsessive-compulsive Disorder	2% (2)	1.8% (1)	1.9% (2)
Panic Disorder	2 % (2)	1.9% (1)	1.9% (4)
Simple phobia	3% (3)	3.2% (3)	3% (6)
Social phobia	4% (4)	4.2% (4)	4% (7)
Non psychiatric diagnosis	22.3% (82)	28.4% (86)	30.3% (130)