



Obesity and Psychiatric Disorders in a Sample of Obese Candidates for Bariatric Surgery in Campania Region

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Abstract

Introduction: Obesity is now considered as pandemic. 40% of Italian population is overweight or obese. Many studies emphasize the association of obesity with mental disorders specifically depressive and anxiety disorders, substance use disorder, personality disorder. It has to be distinguished from the mental dimensions: impulsivity, mood, anxiety and body image connected to the emotional regulation system producing eating behaviors. Obesity subjects differ in eating behaviors: gorging, snacking, sweeteating, grazing and binge that are characterised by different level of psychopathology. Mental disorders are also associated to eating behaviors. Bariatric surgery is considered gold standard therapy for obesity. However, follow-up studies underline that the association obesity-mental disorders determines weight loss failure.

Methods: 2205 obese subjects underwent psychiatric assessment before bariatric surgery. Patients were divided into two groups as result of psychiatric assessment: 1392 obese subjects without association with mental disorders and 813 with mental disorders. These last (mean age 37,63 SD \pm 12,07; 181 M, 632 W; mean body mass index (BMI), 45,16 SD \pm 12,14) were enrolled in this study. Every patient underwent psychiatric evaluation. The absence of mental disorders was considered an exclusion criteria.

Results: In our sample, Binge Eating Disorder (BED) and Night Eating Syndrome (NES) have the major prevalence. General Anxiety Disorder (GAD) and Major Depressive Disorder (MDD) are also related to obesity. Educational level, in our sample, does not influence in a significant way the mental disorders. Age does not change the psychopathological frame.

Conclusion: This study emphasizes that the association between obesity and mental disorders is high among bariatric surgery candidates of our region. The relationship with eating behaviors is connected to the general features of the mental disorders but is not yet clear the reciprocal influences nor why some obese subjects suffer from both and some others does not.

Keywords: Obesity; Mental disorder; Psychopathology; Bariatric surgery; Weight loss

Introduction

Obesity is now considered as pandemic. All over the world obesity rates have increased. In Italy, the obesity adult rate is not so different from other European countries (approximately 10% of population). In 2014, Organization for Economic Co-operation and Development (OECD) study underlines that 40% of Italian population is overweight or obese and this data is consistent with the European rates. However, childhood obesity rates are considered one of the highest (36% for boys and 34% for girls) [1]. In addition, World Health Organization (WHO) projections forewarn that by 2030 disease prevalence rate will nearly double for the Italian community [2]. Obesity is a multifactorial chronic disease determined by genetic, metabolic and psychological factors. The obesity mental field is formed by the relationship between mental dimensions: impulsivity, mood, anxiety and body image connected to the emotional regulation system producing eating behaviors. Obesity subjects differ in eating behaviors: gorging, snacking, sweeteating, grazing and binge that are characterised by different levels of psychopathology related to the mental dimensions and the emotional regulation system [3-8]. The disorder of the mental dimensions should not be confused with the association of obesity with mental disorders. In this instance, obesity is a comorbidity and the relationship can be considered bi-directional. Many studies emphasize the association of obesity with mental disorders specifically depressive and anxiety disorders, substance use disorder and personality disorder connected to dysregulation of biological pathways [9,10]. Moreover, socio-economical and culture factors can be mediators between obesity and mental disorders. Depression and obesity have been well studied and researchers recognized a bi-directional pathway consequence of the interrelationship of brain anatomy and neuromodulation [11,12]. The association with anxiety disorders is more variable and not well

clarified even if obese females have a higher percentage than obese males [10]. Associations with bipolar disorder, psychosis, eating disorders: Binge Eating Disorder (BED) and Night Eating Syndrome (NES) are also described. The overall analysis of the literature highlights the relationship with mental disorders but it does not consider their relationship with eating behaviors that can worsen obesity or determine it. Obesity is a high cost and risk disease in time. Thus it is very important to apply preventing programs beginning with primary health care. Prevention is related to the primary ability to recognize every mental condition that can worsen or be determined by obesity [13]. Bariatric surgery is now the gold standard therapy for obesity and metabolic disease particularly for diabetes type 2. However, the American and European International guide lines, recognizing the importance of psychiatric/psychological factors contributing to obesity, stress the importance of a careful assessment before bariatric surgery [14,15]. Many mental disorders determine weight regain in short and long term or worsen after surgery [16,17]. This study shows the results of a sample of obese patients living in Campania, a region in the South of Italy, and stresses the prevalence of different mental disorders and their relationship with eating behaviors, considering each of them according to data literature and methods.

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The aim of this study is: 1) to describe the association and the prevalence of mental disorders and obesity in our sample; 2) to describe the association with eating behaviors demonstrating that they have different psychopathological traits related also to the specific mental disorders 3) to emphasize the importance of recognizing mental disorders which can determine failure in treatment of obesity surgery.

Materials and Methods

Recruitment

From January 2009 to December 2016, 2205 obese subjects underwent psychiatric assessment before bariatric surgery. The assessment is part of the multidisciplinary program for obesity treatment at Naples School of Medicine “Federico II” Department of Psychiatry: Eating Disorders and Obesity Unit. This Unit is a reference centre for psychiatric/psychological assessment before bariatric surgery of five bariatric surgery units with the highest numbers of operations in Campania region. These centres are Bariatric surgery General Surgery Department School of Medicine “Federico II”, S.Giovanni Bosco Hospital, Cardarelli Hospital, General Surgery Department Second University of Naples. They are also reference centres for other regions in the South of Italy such as Molise, Calabria and Puglia.

813 obese outpatients (mean age 37,63 SD ± 12,07; 181 M, 632 W; mean body mass index (BMI), 45,16 SD ± 12,14) suffering from obesity and mental disorders were enrolled in this study. They were included after the psychiatric examination indicating the association

	SAMPLE pts. 813
SEX	
F	632 (77,73%)
M	181 (22,27%)
AGE, mean (SD)	37,63 (±12,07)
BMI, mean (SD)	45,16 (±12,14)
Educational level	
Low level	
F	371 (58,72%)
M	86 (47,45%)
Middle level	
F	224 (35,36%)
M	80 (44,44%)
High level	
F	37 (5,9%)
M	15 (8,1%)

Table 1: Demographic characteristics of the sample.

Mental Disorders	(%)
BED	24,1
NES	13,53
GAD	36,77
MDD	13,76
IND	4,42
PSYD	3,93
BD	4,54
BLPD	2,09
SUD	1,84
OTHERS	4,89

Table 2: Mental disorders prevalence (%) of the sample.

BED: Binge Eating Disorder; NES: Night Eating Syndrome; GAD: Generalized Anxiety Disorder; MDD: Major Depressive Disorder; IND: Insomnia Disorder; PSYD: Psychotic Disorder; BD: Bipolar Disorder; BLPD: Borderline Personality Disorder; SUD: Substance Use Disorder; OTHERS: Obsessive-compulsive disorder, Epilepsy, Post-traumatic stress disorder, Dementia, Personality disorder

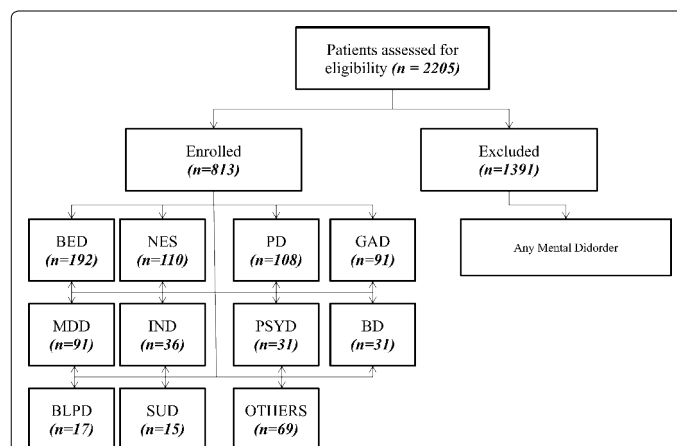


Figure 1: Recruitment flow chart.

BED: Binge Eating Disorder; NES: Night Eating Syndrome; GAD: Generalized Anxiety Disorder; MDD: Major Depressive Disorder; IND: Insomnia Disorder; PSYD: Psychotic Disorder; BD: Bipolar Disorder; BLPD: Borderline Personality Disorder; SUD: Substance Use Disorder; OTHERS: Obsessive-compulsive disorder, Epilepsy, Post-traumatic stress disorder, Dementia, Personality disorder

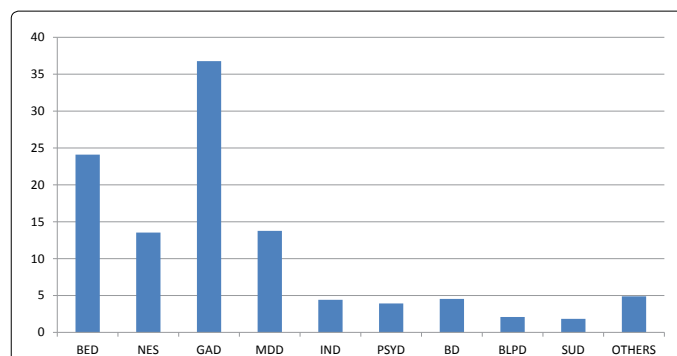


Figure 2: Mental disorders prevalence (%) of the sample.

BED: Binge Eating Disorder; NES: Night Eating Syndrome; GAD: Generalized Anxiety Disorder; MDD: Major Depressive Disorder; IND: Insomnia Disorder; PSYD: Psychotic Disorder; BD: Bipolar Disorder; BLPD: Borderline Personality Disorder; SUD: Substance Use Disorder; OTHERS: Obsessive-compulsive disorder, Epilepsy, Post-traumatic stress disorder, Dementia, Personality disorder

of obesity with mental disorders recognised by using the Diagnostic and Statistical Manual of Mental Disorders DSM 5 [18]. 1391 patients without psychiatric comorbidities were excluded from this study. All participants signed a written consent form before entering the study (Tables 1 and 2, Figures 1 and 2).

Demographic characteristics are shown in Table 1. Mean Body mass Index (BMI) was calculated on the whole sample, not considering each type of mental disorder because BMI is not yet considered a factor that can interfere with the severity of mental disorders. Type and prevalence of mental disorders are described in Table 2.

Every patient underwent psychiatric evaluation, which consisted of

1. Psychiatric examination to include or exclude mental disorders according to the DSM-5. It was performed to consider: patient's mood, level of anxiety, thought content and process, perception and cognition; investigation of the patient's trauma history; past psychiatric treatments (type, duration, and, where applicable,

doses); adherence to past and current pharmacological psychiatric treatments; response to possible past psychiatric treatments according to American Psychiatric Association (APA) guidelines statement for psychiatric evaluation of the mental state [19].

2. Structured eating interview based on the cognitive-behavioral model of Garner and Dalle Grave to identify the eating behaviours in gorging, snacking, sweeteating, grazing and binge created by Dalle Grave in Italian language [20].
3. Psychometric tools performed by rating scales validated in Italian language after the psychiatric examination for reinforcing the diagnosis. These were:

Beck Depression Inventory-II is one of the most widely psychometric tools to assess depression and its severity [21,22]. It was used for Major Depressive Disorders (MDD)

State Trait Anxiety Inventory (Form Y) for General Anxiety Disorders. It measures one's conscious awareness at two extremes of anxiety affect. Higher STAI scores suggest higher levels of anxiety [23].

Barratt Impulsiveness Scale (BIS-11) assesses the personality/behavioral construct of impulsiveness. It is the most widely cited instrument for the assessment of impulsiveness and has been used to advance our understanding of this construct [24-26].

Binge Eating Scale (BES) assesses the presence of binge eating behavior [27,28]. These latter scales were used to assess Binge Eating Disorder (BED) and binge behavior of the other mental disorders described herein.

Association of mental disorders with the prevalent eating behavior is established for each of them to investigate the type of relationship between mental disorder and eating behavior based on psychopathological traits. The study is a prevalence study.

Results

Mental disorders prevalence in our sample is described in Table 2. General Anxiety Disorder (GAD) and Binge Eating Disorder (BED) have the major prevalence. Data analysis shows that if we consider the prevalence of Night Eating Syndrome (NES), Eating Disorders are the most prevalent mental disorders among our sample of patients. Major Depressive Disorder (MDD) is also represented in a high percentage.

	Binge	Gorging	Snacking	Sweeteating	Grazing	Nocturnal eating
BED	100,00%	0,00%	0,00%	0,00%	0,00%	0,00%
NES	0,00%	0,00%	0,00%	0,00%	0,00%	100,00%
GAD	27,09%	39,46%	6,69%	9,36%	13,38%	4,01%
MDD	24,11%	33,04%	4,46%	7,14%	25,00%	6,25%
IND	19,44%	13,88%	8,33%	22,22%	13,88%	22,22%
PSYD	46,88%	28,13%	3,13%	6,25%	6,25%	9,38%
BD	43,24%	8,11%	8,11%	21,62%	13,51%	5,41%
BLPD	76,47%	17,64%	0,00%	0,00%	0,00%	5,88%
SUD	66,66%	0,00%	0,00%	0,00%	13,33%	20,00%
OTHERS	25,00%	12,50%	12,50%	30,00%	12,50%	7,50%

Table 3: Prevalence of eating behaviors of each mental disorder.

BED: Binge Eating Disorder; NES: Night Eating Syndrome; GAD: Generalized Anxiety Disorder; MDD: Major Depressive Disorder; IND: Insomnia Disorder; PSYD: Psychotic Disorder; BD: Bipolar Disorder; BLPD: Borderline Personality Disorder; SUD: Substance Use Disorder; OTHERS: Obsessive-compulsive disorder, Epilepsy, Post-traumatic stress disorder, Dementia, Personality disorder

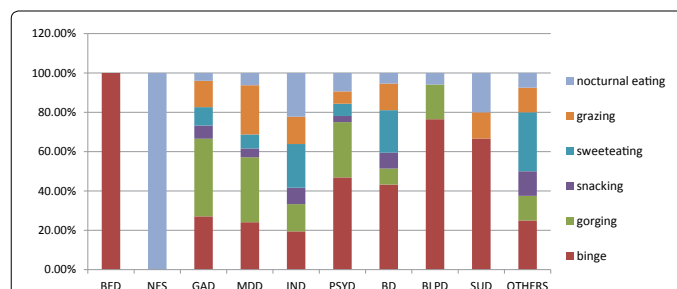


Figure 3: Prevalence of eating behaviors of different mental disorders. BED: Binge Eating Disorder; NES: Night Eating Syndrome; GAD: Generalized Anxiety Disorder; MDD: Major Depressive Disorder; IND: Insomnia Disorder; PSYD: Psychotic Disorder; BD: Bipolar Disorder; BLPD: Borderline Personality Disorder; SUD: Substance Use Disorder; OTHERS: Obsessive-compulsive disorder, Epilepsy, Post-traumatic stress disorder, Dementia, Personality disorder

Educational level, in our sample, does not have any significant influence on the mental disorders (Table 3 and Figure 3). Age does not change the psychopathological frame also because the elderly sample is not significant (Mean age 37,63 SD ± 12,07). The prevalence of eating behaviors associated to each mental disorder are described in Table 3. Data analysis shows that binge behavior is typical according to DSM 5 of Binge eating disorder but is also the most frequent behavior in patients suffering from Psychotic Disorder (PsyD), Bipolar Disorder (BPD), Borderline Personality Disorder (BLPD) and Substance Use Disorder (SUD). Gorging behavior is associated to General Anxiety Disorder (GAD) and Major Depressive Disorder (MDD) and it is totally absent in Substance Use Disorder. Grazing behavior is associated to MDD, Insomnia Disorder and Bipolar Disorder. Sweeteating is related to Insomnia Disorder and Bipolar Disorder. Nocturnal Eating is prevalent in Night Eating syndrome, Insomnia Disorders and Substance Use Disorder.

Discussion

Factors determining obesity are widely discussed in the scientific community. They are related to culture, emotional, metabolic and neurobiological aspects. Analysis of the studies show many controversial and different positions in the evaluation of the importance of environmental factors. One of these is the relationship with educational level. Some studies underline the importance of it on obesity development [29,30]. In our sample, the educational level does not have statistical significance probably because the prevalent status is of low educational level. This data is consistent with obesity distribution rate among the Campania population which indicates a major prevalence in the low cultural inhabitants.

General features and the association with eating behaviors are discussed in the following sections for each mental disorder.

Binge eating disorder: BED

Many studies underline the major frequency of BED in bariatric surgery population [31-34]. Its rate is increasing among obese and overweight population even if it is not related to BMI determining physical effects that lead to high socio-economic impact. DSM 5 included BED among the eating disorders describe binge as the marker symptom [30,35]. BED has a disorder of all mental dimensions concerning obesity: impulsivity, body image, mood and anxiety [7,36,37]. Impulsivity disorder is the most studied and researchers debate on the relation between BED and Impulse Control Disorders or the addictive disorders even if binge behavior is similar but not

equal to craving [38-40]. In our sample, BED has the high prevalence (23,6%). Binge behavior is the only eating behavior according to DSM 5. In our experience, often BED is not recognized and is hidden by obesity. The screening for bariatric surgery that we adopted which stress the psychopathological traits allow us to establish specific psychiatric treatment before bariatric surgery. BED patients do not undergo bariatric surgery and begin psychiatric treatments, generally psychotherapy and psychopharmacology according to bariatric surgery follow-up studies that emphasize frequent weight regain in the long term [41].

Night eating syndrome: NES

NES is defined as an Eating Disorder characterized by “a dysfunction of circadian rhythms with a disassociation between eating and sleeping. Core criteria include a daily pattern of eating with a significantly increased intake in the evening and/or night time” [42-45]. Currently, many studies underline the prevalence of food intake at night related to specific cultural habits of every country [46,47]. Data analysis of our sample shows that: 1) NES has a prevalence of 13,53% among the mental disorders and nocturnal eating is the diagnostic marker. However, daily anorexia is not present and other eating behaviors are associated during the day, especially daily binge [44,45,48]. The meaning of these data should be investigated to better understand the psychopathological features of NES. Bariatric surgery follow-up studies stress failure in weight loss in the long term related to high levels of impulsivity [49-51].

Generalized anxiety disorder: GAD

In our sample General Anxiety Disorder (GAD) has the higher prevalence among the mental disorders. Our study shows a prevalence in the female group compared to the male group in accordance with the study data [51-53]. The specific factors producing this association are not well defined. Some studies emphasize the role of psychological distress related to a negative judgment of the environment, feelings of exclusion typical to obese patients that can increase anxiety leading to Panic Disorder [54,55]. In our sample, the relationship with eating behavior shows a prevalence of binge, grazing and nocturnal eating which are all considered maladaptive behaviors. Data analysis lead us to hypothesize that personality trait anxiety can be a risk for developing GAD and its subtypes in obese populations and that eating behavior can act as a mediator. The prevalence of gorging behavior in our sample can be related to GAD, which determines hyperphagia and consequent obesity. Further studies on the relationship between GAD and obesity could explain if there is, like MDD, a bi-directional relationship between anxiety-obesity and obesity-anxiety. Moreover GAD is considered a risk for bariatric surgery. Many studies stress that it can worsen after surgery determining an increase of the symptoms and failure of weight loss [56-58].

Major depressive disorders: MDD

In our sample, the association between obesity and major depressive disorders (MDD) has a high prevalence. The causes of this finding is not yet clear. According with literature studies our sample also shows a bi-directional relationship obesity-depression and depression-obesity [59-61]. The analysis of the specific sample highlight that many patients assumed antidepressant therapy at the time of psychiatric evaluation and the effects on weight gain of SSRI antidepressant drugs as side effects are well known. However many studies emphasize that depression symptoms can influence the development of obesity over time especially feelings of sadness, emptiness, hopelessness, reduction of activities for most of the day or every day [59]. In our sample, the

mean BDI-II score is 25,4 which points out the presence of depression. On the other hand, metabolic syndrome and the increase of adiposity which is typical in obese patients, determines the development of inflammatory processes and the consequent alteration of brain function [61-63]. Obesity also occurs as a consequence of the high caloric intake determined by maladaptive eating behaviors, such as in our sample binge and grazing [48,64,65]. The association with grazing could be explained by the disorder of mood and anxiety that characterizes this behavior [7]. Further studies on psychopathological features must be done to clarify the meaning and the effects of grazing. Gorging and snacking eating behaviors seem to be a consequence of depression, reinforcing the depression-obesity pathway more than obesity-depression. In our sample, almost half of patients had SSRI + Benzodiazepine treatment for more than a year at our psychiatric assessment contributing to overeating and obesity. The association of binge or grazing behavior with depression is predictive of weight gain in the long term after bariatric surgery. International and Italian guidelines stress the necessity of depression treatment before surgery to avoid the worsening of symptoms and to prevent weight regain [14,15,65].

Insomnia disorder: IND

In our sample, Insomnia Disorder is one of the most frequent. In our experience this is provoked by physical impairment such as Sleep Apnea and mental factors related to neuroendocrine facets and anxiety structure. Moreover, insomnia contributes to obesity provoking psychosocial impairment and a reduction of physical activity [66-69]. In our sample, IND is predominantly associated with maladaptive eating behaviors particularly grazing and sweet-eating. We hypothesize that anxiety that is a facet of grazing behavior can interfere with the quality and quantity of sleep. Sweeteating, according to studies improves insulin resistance and determines short sleep through the alteration of Gut axis and neuroendocrine connections. We consider the association with Binge behavior as a symptom of other mental disorders that by themselves can produce IND. Sleep features must be investigated within the psychiatric assessment before bariatric surgery and treatment must be placed before the patient undergoes the operation.

Bipolar disorder and psychotic disorder: BD and PsyD

BD and PsyD are jointly discussed because the overall mechanism determining obesity and the influence of these diseases on obesity seems to be the same according to the overall analysis of the studies. Bipolar and psychotic patients have a high rate of obesity. This association has many related factors such as genetic, metabolic and treatment dependent factors [70-74].

In our sample, BD patients have binge as prevalent eating behaviors, but all maladaptive behaviors such as grazing and sweeteating are also significant. This finding leads us to think that obesity can be also the consequence of high caloric food-intake. The association with binge behavior is also explained by the high levels of impulsivity of BD particularly of maniac phase. BD is characterized by the disinhibition of impulse control and also by the dysregulation of the hunger/satiety system [75]. Similarly, the association with grazing and sweeteating which are considered maladaptive behaviors is related to the dysregulation of impulse control and belongs to Loss of Control (LOC) spectrum. Thus, eating behaviors can be considered symptoms of BD psychopathology. The same mechanisms can be described for Psychotic Disorders. Binge as a symptom of BD must be recognized above all in bariatric surgery candidates. Surgery is not able to determine weight loss. Follow-up studies show that BD patients do

not achieve weight loss because they can't cope with post-operation program and because drug treatments on their own have an obesogenic side effect. Particularly patients suffering from psychotic disorders have a major cognitive impairment and are not able to follow the bariatric surgery post-operation program. This condition affects the choice of malabsorptive type of operation which can determine physical effects related to malnutrition and reduces the absorption of the specific drugs determining less control of BD and PsyD positive symptoms after surgery [76,77].

Borderline personality disorder: BPD

Borderline personality disorder (BPD) is a serious mental disorder marked by a pattern of ongoing instability in moods, behavior, self-image, and functioning. These experiences often result in impulsive actions and unstable relationships. The definition of Borderline underlines the link with addiction traits and this explains the prevalent association with binge behavior which we found in our sample. Binge is related to Impulse Control Disorder and addiction by neurobiological and emotional links as many studies underline [32,38,78]. Impulsive disorder is frequent in borderline patients and also in this case binge leads to obesity and the worsening of mental health. In our sample, the eating behaviors related to Borderline are binge and gorging. These data underline that binge is related to the incidence of impulse disorder. The presence of gorging, considered an eating behavior with low psychopathology, shows that a dysregulation of hunger/satiety system exists [7]. Further studies should investigate the relationship between obesity and BPD. Bariatric surgery must be chosen carefully above all for reduction of drug levels consequence of malabsorption and cannot be effective in patients with binge behavior.

Substance use disorder: SUD

Substance Use Disorder does not have a high prevalence in our study but the association with binge behavior or in general with all maladaptive eating behavior lead us to think about the relationship with craving and the disorder of the food-reward system. This result is according with the studies even if does not clarify the mechanism of this association [79-82]. Further studies could investigate the brain connection and the alteration of the regulation system. In our sample, SUD is related to binge, grazing and nocturnal eating. The association with binge and the others maladaptive eating behaviors characterized by medium impulsivity (grazing) and alteration of the food-reward system (nocturnal eating) could be considered as the expression of the same brain functioning related to addiction. The psychological analysis stresses the inability to stop using substances or food, low self-esteem, the necessity to escape from the social functions considered by patients as a continuous demonstration of their inability determining negative judgment and refusal by the environment. Bariatric surgery guidelines and follow-up studies show that patient suffering from SUD have a high risk of worsening after the operation and failure in weight loss.

Conclusion

This study emphasizes that the association between obesity and mental disorders is high among bariatric surgery candidates of our region. The relationship with eating behaviors is connected to the general features and to the alterations of brain functions of the mental disorders examined.

Limits

One limits of this study is that it does not present results that can

elucidate the quality of the relationship between mental disorders and eating behaviors on the basis of brain alteration. Further studies on the quality of mental dimensions concerning obesity and the relationship with brain function can be useful for a better understanding of the psychopathological mechanisms conducting to the association between mental disorders and obesity. Moreover this study does not show results based on retrospective analysis. It describes observational data.

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